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[OFFICIAL NOTICE.]

Ohio Gas Light Association.

OFFICE OF SECRETARY,
COLUMBUS, O., February 21, 1889.

To Members of the Ohio Gas Light Association:—As heretofore announced the Fifth Annual Meeting of this Association will be held at Mansfield, Ohio, March 20 and 21, 1889; the first day's session to begin at 9:30 A.M. standard time.

The following papers are promised for the meeting:

1. "The Methods of Taxation of the Different Gas Companies, and a Comparison of the Same," by H. Wilkiemeyer, Portsmouth, Ohio.
2. "Fuel Gas and Incandescent Gas Lighting," by Edward Lindsley, Cleveland, Ohio.
3. "Gas Monopoly," by W. W. Cantine, Alliance, Ohio.
4. "A Holder-Tank Problem," by Geo. H. Tayler, Warren, Ohio.
5. "Oil as a Fuel under Boilers," by J. W. Gwynn, Bucyrus, Ohio.
6. "Carbureted Water Gas and its Advantages over Coal Gas," by Chas. R. Faben, Jr., Toledo, Ohio.
7. "The Lowest Price at which Gas can be Profitably Sold in Small Towns," by H. L. Hurlburt, Oberlin, Ohio.
8. "Fuel Gas: Results of Experience in its Manufacture, Distribution and Use," by Chas. H. Evans, Jackson, Mich.
9. "The Welsbach Burner as a Commercial Article," by Geo. W. Graeff, Jr., Philadelphia, Pa.
10. "Advantages of a Combined Coal and Water Gas Plant," by Geo. Light, Dayton, Ohio.
11. "Results of the Adoption of Electric Lighting by a Gas Company," by L. A. Strong, Mansfield, Ohio.
12. "Is the Supply of Natural Gas in the Ohio Valley Failing?" by Eugene Printz," Zanesville, Ohio.

In connection with the meeting there will be an exhibit of gas stoves, engines, burners, electric motors and any and all kinds of apparatus and appliances of interest to gas men and the lighting fraternity. A large room close to the place of meeting has been secured for this purpose, and the interims of the various sessions can be pleasantly and profitably spent in examining this display, which promises to be much more complete and interesting than the one shown at our last annual meeting.

In addition to this exhibit other objects of interest to members and visitors will be found in Mansfield's Electric Street Railway, the Gas Company's electric light works, and their new water gas plant.

The St. James Hotel will be the headquarters of our Association, where very reasonable terms have been secured for members and visitors in attendance at the meeting. The sessions will be held in a suitable hall in the block adjoining the St. James.

All members are again urged to attend this meeting prepared to participate in the discussion of papers read.

Persons eligible to membership, who are not already members, are cordially invited to be present and join our Association. Visitors from other States and Associations will be welcome.

Very respectfully, IRVIN BUTTERWORTH, Secy.

[OFFICIAL NOTICE.]

Second Annual Meeting of the Southwestern Gas Association.

FORT WORTH, TEXAS, Feb. 11, 1889.

The Second Annual Meeting of the South Western Gas Association will be held at Austin, Texas, Tuesday, March 19, 1889. It is earnestly requested that every member of the Association will make arrangements to be there. Matters of importance will come up for consideration, and a full attendance is desired.

There will be several interesting papers presented, and a good time generally is expected.

Austin is a city of especial interest to the fraternity, and in fact to everyone, being the central ray of that effulgent orb known as the Lone Star, Texas.

To those engaged in the gas business in Louisiana, Arkansas, Kansas, Colorado, New Mexico and Texas a cordial invitation is extended to join us and lend their aid and influence in the common cause—mutual improvement. This is not a Texas institution, but is designed to bring the gas men of the great South West into a union where they can compare experiences which are peculiar to our locality. Don't forget to come.

THOS. D. MILLER, Secy.

BRIEFLY TOLD.

THE EIGHTY-NINE MEETING OF THE NEW ENGLAND ASSOCIATION.—Having about exhausted, in our earlier references to the Nineteenth Annual Meeting of the New England Association of Gas Engineers, all available resources for predicting success, complete and gratifying, in connection with that promised assemblage, it only remains now to report whether or not those predictions were to be verified in the outcome of actual results. There can be no doubt that everyone experiences gratification in asserting that that which he had foretold came to pass, and it is also true that the prophet's conscience seldom gives him a twinge should he indulge in a "magnification," greater or less, of the exactness of the realization of his advance declarations. We think, however, that every individual present at the gathering last month in Young's Hotel, no matter in what capacity he attended—either as officer, member or guest—will subscribe to the verdict that no better or more satisfactory meeting of the New England Association of Gas Engineers has been recorded. In the first place, the winter season now nearing a close lightened the burden of the Eastern gas maker of much of the anxiety and labor which usually come to him in our dark days. True it is that the calendar hours of sunshine were not in conflict with the records but the actual hours were far greater than those usually experienced. Nor did the Eastern gas man have to complain of many or violent winter storms. And as atmospheric conditions have much to do with his physical and mental feelings, hence it is not strange that he could as a rule apply himself with greater diligence and application to preparing for his part in the Boston proceedings.

President Norton, seemingly unmarked by a single scar because of the recent upheaval at Nashua, no doubt fully appreciated the responsibility of directing the actions of the solid-appearing, dignified body of brethren who greeted with applause his appearance before the speaker's table; but the man who ruled Nashua from her mayoralty chair as she had never been ruled before—which is saying a great deal—was bound to hold the reins with tact and caution. And he did so, too; wherefore we are sorry that his "one term" views were so pronounced as to cause him to positively decline a re-election. The attendance was up to the expectations of the most sanguine, and as those present stand for themselves, we have only to remark that the absence of at least two who are wont to gather with the clans was sorely felt by many. Again was the genial Rollins unable to respond to the Muster roll, and sturdy Armington failed to answer to the Secretary's call. They may both, however, know that they shared in full measure the best wishes of their confreres.

That the Association is to progress and prosper may well be augured from the large accessions made to the membership list, and it is evident that the classification plan is bound to work out in accordance with the ideas of those who framed the policy. Another very graceful and heartily well received act was the naming of Mr. Eugene Vanderpool, of Newark, N. J., and Col. Fred. S. Benson, of Brooklyn, N. Y., to honorary membership in the Association. They each merited the compliment; both will sustain it worthily.

Careful and methodical Secretary Nettleton shows in his report what good management can do towards "conserving the finances," and this leads us to the remark (which is solely chargeable to ourselves) that the members of the Association performed an act of simple justice to Mr. Nettleton when they increased the salary of their Secretary just 100 per cent., and it might be in order to suggest that it is not yet any too large. We, who have pretty good facilities for knowing about these things, can truthfully say that the secretaries of our various Associations are hard-worked men, and are also, we fear, underpaid—even giving their allowances proper credit for their respective willingness to be of assistance to their fellows. It is only simple justice, then, that as their labors increase from year to year, and as the Associations' revenues increase, they should be awarded something like adequate compensation for their work.

It is satisfactory to note that the paper list did not not show a missing factor. All the pledges were redeemed, and in a manner worthy of all praise. We note that Mr. Todd is responsible for having made one contributor to the current paper list; for Mr. Cooper's recital of "Incidents in the Life of a Superintendent of a Small Gas Works" makes no attempt at concealing the fact that Mr. Todd's paper last year in a somewhat similar vein was the spur that moved him on. In connection with the papers, and following out our usual custom, we shall make no comparisons thereon, preferring that our readers—who would do so in any event—shall draw their conclusions as fancy suits or judgment dictates. We cannot, however, refrain from expressing admiration of the thoughtful report presented by the Commitee on "Photometric Standards," which, following up as it does the precise and accurate findings submitted last fall to the American Association by its Committee on "Standard Meter Unions," amply proves that the reference of any matter to a special committee does not mean that "that is the last of it." Messrs. Prichard and Taber richly merited the vote of thanks awarded them, as they also do the warm commendation of the fraternity at large, who cannot help but be bettered by the committee's unpaid labor. We will, however, say a single word about the paper submitted by the Sage of Pawtucket, and that word is that it is of a piece with himself—that one needs not to ponder greatly over it to find out where its author stands in respect of the subject discussed. And as every one knows who knows him at all, he never takes a bye-way when the high road leads him on his journey with similar directness. President Norton, whose address, though rather brief, is pithy, evidently stands towards the dual lighting supply in a doubtful attitude. Still this, instead of being open to the charge of accusing him of indirection, is but another evidence of his caution; for his new field will enable him to glean all that is necessary to the formation of a sound opinion. Indeed, he puts this himself very nicely in the sentence, "There are fears and criticisms more valuable than hopes and praises; for they lead to the highways of safety and prosperity." Those who are urging the rapidity of the world's flight upon the attention of their neighbors, might do well to commit that Nortonian sentence to memory. The other Norton (Dr. L. N.), who held the attention of the Association with interest for something over an hour on the afternoon of the first day, only emphasizes pleasantly the advance that is being made in the desire to absorb a knowledge of the chemistry of gas making. Some years ago, even in the New England Association, we fear, such a discourse would have been dodged by many as being dull; but the era of study is upon us—and long may it remain with us. Take it all in all, as remarked at the qutset, the meeting from a purely technical standpoint was a thorough success in all respects. And as it was with the latter, so also was it with the social features of the gathering. The banquet was served in the shape and quality for which Young's hostelry is noted; and about no higher meed of praise may be awarded, even were one disposed to seek further for words wherewith to clothe an encomium. And as so long a time has elapsed since the walnuts and wine of that particular gathering were handed over to the guests, perhaps it is better now not to mar the flavor of the one nor to dim the sparkle of the other by attempting to describe the festivities of the occasion. These were enjoyable and well held in tone by the toastmaster, whose modesty is such that we fear to reveal his identity by spreading his name in cold type to the gaze of the many. He, however, has that satisfaction which springs from a knowledge of having directed a delicate task, without reproach from any.

WITH this number of the JOURNAL we print what shall probably be the last circular prepared by Secretary Butterworth with reference to the Mansfield meeting of the Ohio Association. The paper list, as will be seen from the latest official announcement, presents an attractive and instructive collection of subjects. And we have no doubt that, while all will be hailed with interest, the paper by Mr. Evans will be awaited with impatience. We also discover with pleasure the name of Mr. Herman Wilkiemeyer who proposes to again treat of a phase of the gas industry allied to the law. His contribution of a year ago leads us to anticipate another similar test. Mr. Faben, of Toledo, will also beyond doubt mark his debut as a contributor with eclat. We are pleased to be able to say that the gas apparatus exhibition bids fair to be quite imposing.

IN another column we print an account, contributed by a Cincinnati correspondent, of the Council meeting at Cleveland at which the Hull opposition ordinance was indefinitely postponed. Too late for publication therewith in its proper place, we received a subsequent communication from the same source explaining that at the next meeting of the Council, Mr. Faulhaber presented a resolution which proposed to submit the question of authorizing the Cleveland Fuel, Lighting and Power Company "to construct, build and operate in said city gas works for the manufacture, distribution and sale of fuel and illuminating gas," to the voters of Cleveland at their municipal election next spring. The resolution was tabled.

STRANGE to say, Mayor Jacob, of Louisville, Ky., has communicated his belief to the Council, in the shape of a most temperate and carefully prepared paper, that the central portion of the city should be lighted by arc lamps, and suggests that the Louisville Gas Company is the proper corporation to be entrusted with the task. The proprietors of the Company have applied to the Legislature for the necessary change in their charter to enable them to comply with the Mayor's suggestion. If the same is granted (and there is no good cause or reason for thinking that the consent will be withheld) the Gas Company will be guranteed an exclusive right for maintaining public arc lights, although the supply of commercial lights shall yet remain open to competition.

[Official Report—Revised by the Secretary.]

Nineteenth Annual Meeting, New England Association of Gas Engineers.

Held at Young's Hotel, Boston, Mass., February 20 and 21, 1889.

First Day—Wednesday, Feb. 20—Morning Session.

The New England Association of Gas Engineers held its Nineteenth Annual Meeting, at Young's Hotel, Boston, on Feb. 20 and 21, 1889, the President, Mr. A. M. Norton, in the Chair. The first session began on Wednesday, Feb. 20, at 10 A.M. On motion of Mr. Stiness, the reading of the minutes of the last meeting was omitted.

The Chair, having appointed Messrs. A. B. Slater and H. A. Allyn a committee to invite visitors to seats in the convention, the following gentlemen were introduced and welcomed by the President:

F. E. Barker.	F. W. Floyd.	W. Mooney.	P. W. Sprague.
J. S. Bush.	W. W. Goodwin.	W. McDonald.	F. R. Sprague.
C. W. Blodget.	G. W. Graeff, Jr.	F. H. Odiorne.	F. H. Shelton.
T. V. Church.	G. F. Kreischer.	J. D. Perkins.	G. W. Stephens.
W. H. Down.	T. G. Lansden..	I. N. Stanley.	W. H. White.
E. J. Enfer.	E. Lenz.	C. H. Sprague.	O. B. Weber.

Applications for and Election to Membership.

Applications for membership were received from the following-named gentlemen:

Active Members.

W. T. Sanborn, Dover, N. H.	George T. Goodno, Dedham, Mass.
W. P. Addick, Boston, Mass.	Henry H. Kelly, Greenfield, Mass.
Robert Amory, Brookline, Mass.	George F. Macmun, Natick, Mass.
H. N. Biglow, Clinton, Mass.	Louis Malm, Marblehead, Mass.
Isaiah E. Coffin, Nantucket, Mass.	A. B. Slater. Jr., Providence, R. I.
Samuel J. Fowler, Westfield, Mass.	W. A. Stedman, Jr., Hartford, Conn.

Associate Members.

Cyrus M. Coburn, Chelsea, Mass.	Nathaniel Tufts, Boston, Mass.
F. J. Davis, Waltham, Mass.	Charles S. Waldo, Boston, Mass.
C. H. Gifford, New Bedford, Mass.	J. A. Waldo, Boston, Mass.
Nat. Gifford, New Bedford, Mass.	Rufus E. Holmes, Winsted, Conn.
G. E. Kenyon, Jamaica Plain, Mass.	R. R. Smith, New Hartford, Conn.
F. Tobey, Jr., New Bedford, Mass.	

Having been approved by the Board of Directors, the Secretary was instructed to cast the ballot of the Association for the gentlemen named, and they were thereupon declared duly elected members of the Association, and were introduced to the Association by the President.

Roll Call.

Upon the call of the roll the following members responded to their names:

Honorary Members.

Jos. R. Thomas, New York City. Fred. S. Benson, Brooklyn, N. Y.
Eugene Vanderpool, Newark. N. J.

Active Members.

C. T. Frost, Rockland, Me.	M. S. Greenough, Boston, Mass.
A. H. Parker, Bangor, Me.	J. L. Hallett, Springfield, Mass.
Wm. Badger, Concord, N. H.	E. Hassett, Beverly, Mass.
Wm. D. Cadwell, Nashua, N. H.	C. J. R. Humphreys, Lawrence, Mass.
H. S. Chase, Great Falls, N. H.	M. Jewitt, Clinton, Mass.
A. F. Cooper, Exeter, N. H.	E. C. Jones, Boston, Mass.
J. M. Hill, Concord, N. H.	C. D. Lamson, Worcester, Mass.
A. M. Norton, Nashua, N. H.	H. B. Leach, Taunton, Mass.
F. H. Parker, Burlington, Vt.	W. A. Learned, Newton, Mass.
H. A. Allyn, Cambridge, Mass.	R. J. Long, Salem, Mass.
Wm. Anderson, Marlboro', Mass.	R. J. Monks, Woburn, Mass.
John Andrew, Chelsea, Mass.	D. Moore, Salem, Mass.
H. A. Atwood, Plymouth, Mass.	G. B. Neal, Boston, Mass.
G. D. Bill, Malden, Mass.	H. A. Norton, Boston, Mass.
F. C. Blood, Ware, Mass.	C. F. Prichard, Lynn, Mass.
D. Boynton, Chicopee, Mass.	J. F. Rogers, Boston, Mass.
J. H. Burnham, Boston, Mass.	W. H. Snow, Holyoke, Mass.
G. D. Cabot, Lawrence, Mass.	C. S. Spaulding, Brookline, Mass.
J. A. Coffin, Gloucester, Mass.	J. Q. A. Spear, Dorchester, Mass.
H. F. Coggshall, Fitchburg, Mass.	W. K. Stratton, Haverhill, Mass.
P. Coyle, Boston, Mass.	R. B. Taber, New Bedford, Mass.
D. W. Crafts, Northampton, Mass.	A. W. Tarbell, Boston, Mass.
O. E. Cushing, Lowell, Mass.	W. Tarbell, Waltham, Mass.
A. M. Copp, Boston, Mass.	D. D. Tilton, Newburyport, Mass.
F. R. Davis, Athol, Mass.	L. W. Wells, Boston, Mass.
G. E. Wetherbee, Worcester, Mass.	W. A. Stedman, Newport, R. I.
G. Wood, New Bedford, Mass.	S. G. Stiness, Pawtucket, R. I.
W. A. Wood, Boston, Mass.	J. P. Harbison, Hartford, Conn.
R. Woodward, Waltham, Mass.	E. C. Learned, New Britain, Conn.
Z. M. Jenks, Woonsocket, R. I.	C. H. Nettleton, Birming'm, Conn.
J. H. Manchester, Bristol, R. I.	F. C. Sherman, New Haven, Conn.
A. K. Quinn, Newport, R. I.	J. R. Todd, Middletown, N. Y.
A. B. Slater, Providence, R. I.	C. F. Warren, Manchester, N. H.

Associate Member.

F. P. Fairbanks, Manchester, N. H.

The President, the Hon. A. M. Norton, then read the following address:

PRESIDENT'S ADDRESS.

Gentlemen of the New England Association of Gas Engineers:

We are again assembled in annual meeting for the purpose of consultation as to the best means and modes of preserving, extending and improving the interests of that great industry with which we are so intimately connected. A time-honored custom seems to require that on these occasions your presiding officer should present a brief address that may serve as a preface to the more interesting and important subjects which are to follow.

The first and most pleasant duty which falls to my lot is that of welcoming you one and all to another meeting, and congratulating you upon the prosperity which the companies that we represent have enjoyed almost, if not quite, without exception during the past year. There are few industries in existence which have afforded a better investment, when tried by the double standard of safety and of dividend; and whether in the future the prosperity of this great industry is to be diminished or increased depends, in a great degree, upon the members of our profession, here and elsewhere.

We have this day assembled to compare observations, experiences and results, hoping that from this mass of our collected knowledge we may gather that which will be the most useful and, therefore, the most valuable. And the benefits that flow from this Association are not confined to the regular proceeding, but are derived largely from the informal social intercourse of members. There is no man, however humble, whose experience does not include some fact unknown to all others. And in these private conversations points are brought out, information gained, and difficulties removed that are not, and cannot be, reached by the regular order of our proceedings. And at present it especially behooves us to take earnest public and private counsel with each other. The time has passed when a gas company can demand such a price as will yield the profit desired, and collect it without difficulty. First of all we must accommodate ourselves to the new demands which are now made upon us, and meet with cheaper or better light our competitors in the race for public favor.

It is not my purpose nor my province to discuss in detail the relative merits of gas and electricity for lighting—that subject will be presented most ably by another—but only to offer some suggestions upon the present conditions of the problem with which we are confronted.

Many of us will recall that a few years ago, under the influence of the claims put forth by the enthusiastic advocates of lighting by electricity, public confidence in gas stocks was seriously impaired, and many of our own number had grave doubts as to the future well-being of the gas industry. Time has greatly moderated the extravagant pretensions of the one class and the fears of the other, and to-day the relative merits and capabilities of both are better known by that best of all tests—experience. We, as gas men, must recognize the fact that if the present conditions of both of these illuminating agents remain the same, lighting by electricity has come to stay; for under certain conditions of place—as theaters, public buildings, squares and streets—it is a better light than can be furnished by gas to-day. But in the essential elements of cheapness, reliability, and adaptation to general use, gas retains a decided superiority over electricity. And notwithstanding the great number of electric light plants that have been established everywhere, it would be difficult, and I think impossible, to point out a single city or town in which the consumption of gas for lighting is not steadily increasing year by year. The electric lamp can hardly be found in a private house to-day, save in those few palatial residences that great wealth has erected. But even here gas will be found side by side, and I do not know of a public building of any description that has been erected, whatever the appliances for electric lighting, that does not contain gas pipes also.

Undoubtedy in the future, as in the past, great improvements will be made in the development of gas and electricity as illuminating agents. In reducing the cost of gas, in improving its quality, in perfecting its distribution, and in utilizing the waste products, much has been and

BRIEFLY TOLD.

THE EIGHTY-NINE MEETING OF THE NEW ENGLAND ASSOCIATION.—Having about exhausted, in our earlier references to the Nineteenth Annual Meeting of the New England Association of Gas Engineers, all available resources for predicting success, complete and gratifying, in connection with that promised assemblage, it only remains now to report whether or not those predictions were to be verified in the outcome of actual results. There can be no doubt that everyone experiences gratification in asserting that that which he had foretold came to pass, and it is also true that the prophet's conscience seldom gives him a twinge should he indulge in a "magnification," greater or less, of the exactness of the realization of his advance declarations. We think, however, that every individual present at the gathering last month in Young's Hotel, no matter in what capacity he attended—either as officer, member or guest—will subscribe to the verdict that no better or more satisfactory meeting of the New England Association of Gas Engineers has been recorded. In the first place, the winter season now nearing a close lightened the burden of the Eastern gas maker of much of the anxiety and labor which usually come to him in our dark days. True it is that the calendar hours of sunshine were not in conflict with the records but the actual hours were far greater than those usually experienced. Nor did the Eastern gas man have to complain of many or violent winter storms. And as atmospheric conditions have much to do with his physical and mental feelings, hence it is not strange that he could as a rule apply himself with greater diligence and application to preparing for his part in the Boston proceedings.

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That the Association is to progress and prosper may well be augured from the large accessions made to the membership list, and it is evident that the classification plan is bound to work out in accordance with the ideas of those who framed the policy. Another very graceful and heartily well received act was the naming of Mr. Eugene Vanderpool, of Newark, N. J., and Col. Fred. S. Benson, of Brooklyn, N. Y., to honorary membership in the Association. They each merited the compliment; both will sustain it worthily.

Careful and methodical Secretary Nettleton shows in his report what good management can do towards "conserving the finances," and this leads us to the remark (which is solely chargeable to ourselves) that the members of the Association performed an act of simple justice to Mr. Nettleton when they increased the salary of their Secretary just 100 per cent., and it might be in order to suggest that it is not yet any too large. We, who have pretty good facilities for knowing about these things, can truthfully say that the secretaries of our various Associations are hard-worked men, and are also, we fear, underpaid—even giving their allowances proper credit for their respective willingness to be of assistance to their fellows. It is only simple justice, then, that as their labors increase from year to year, and as the Associations' revenues increase, they should be awarded something like adequate compensation for their work.

It is satisfactory to note that the paper list did not not show a missing factor. All the pledges were redeemed, and in a manner worthy of all praise. We note that Mr. Todd is responsible for having made one contributor to the current paper list; for Mr. Cooper's recital of "Incidents in the Life of a Superintendent of a Small Gas Works" makes no attempt at concealing the fact that Mr. Todd's paper last year in a somewhat similar vein was the spur that moved him on. In connection with the papers, and following out our usual custom, we shall make no comparisons thereon, preferring that our readers—who would do so in any event—shall draw their conclusions as fancy suits or judgment dictates. We cannot, however, refrain from expressing admiration of the thoughtful report presented by the Commitee on "Photometric Standards," which, following up as it does the precise and accurate findings submitted last fall to the American Association by its Committee on "Standard Meter Unions," amply proves that the reference of any matter to a special committee does not mean that "that is the last of it." Messrs. Prichard and Taber richly merited the vote of thanks awarded them, as they also do the warm commendation of the fraternity at large, who cannot help but be bettered by the committee's unpaid labor. We will, however, say a single word about the paper submitted by the Sage of Pawtucket, and that word is that it is of a piece with himself—that one needs not to ponder greatly over it to find out where its author stands in respect of the subject discussed. And as every one knows who knows him at all, he never takes a bye-way when the high road leads him on his journey with similar directness. President Norton, whose address, though rather brief, is pithy, evidently stands towards the dual lighting supply in a doubtful attitude. Still this, instead of being open to the charge of accusing him of indirection, is but another evidence of his caution; for his new field will enable him to glean all that is necessary to the formation of a sound opinion. Indeed, he puts this himself very nicely in the seatence, "There are fears and criticisms more valuable than hopes and praises; for they lead to the highways of safety and prosperity." Those who are urging the rapidity of the world's flight upon the attention of their neighbors, might do well to commit that Nortonian sentence to memory. The other Norton (Dr. L. N.), who held the attention of the Association with interest for something over an hour on the afternoon of the first day, only emphasizes pleasantly the advance that is being made in the desire to absorb a knowledge of the chemistry of gas making. Some years ago, even in the New England Association, we fear, such a discourse would have been dodged by many as being dull; but the era of study is upon us—and long may it remain with us. Take it all in all, as remarked at the outset, the meeting from a purely technical standpoint was a thorough success in all respects. And as it was with the latter, so also was it with the social features of the gathering. The banquet was served in the shape and quality for which Young's hostelry is noted; and about no higher meed of praise may be awarded, even were one disposed to seek further for words wherewith to clothe an encomium. And as so long a time has elapsed since the walnuts and wine of that particular gathering were handed over to the guests, perhaps it is better now not to mar the flavor of the one nor to dim the sparkle of the other by attempting to describe the festivities of the occasion. These were enjoyable and well held in tone by the toastmaster, whose modesty is such that we fear to reveal his identity by spreading his name in cold type to the gaze of the many. He, however, has that satisfaction which springs from a knowledge of having directed a delicate task, without reproach from any.

WITH this number of the JOURNAL we print what shall probably be the last circular prepared by Secretary Butterworth with reference to the Mansfield meeting of the Ohio Association. The paper list, as will be seen from the latest official announcement, presents an attractive and instructive collection of subjects. And we have no doubt that, while all will be hailed with interest, the paper by Mr. Evans will be awaited with impatience. We also discover with pleasure the name of Mr. Herman Wilkiemeyer who proposes to again treat of a phase of the gas industry allied to the law. His contribution of a year ago leads us to anticipate another similar test. Mr. Faben, of Toledo, will also beyond doubt mark his debut as a contributor with eclat. We are pleased to be able to say that the gas apparatus exhibition bids fair to be quite imposing.

IN another column we print an account, contributed by a Cincinnati correspondent, of the Council meeting at Cleveland at which the Hull opposition ordinance was indefinitely postponed. Too late for publication therewith in its proper place, we received a subsequent communication from the same source explaining that at the next meeting of the Council, Mr. Faulhaber presented a resolution which proposed to submit the question of authorizing the Cleveland Fuel, Lighting and Power Company "to construct, build and operate in said city gas works for the manufacture, distribution and sale of fuel and illuminating gas," to the voters of Cleveland at their municipal election next spring. The resolution was tabled.

STRANGE to say, Mayor Jacob, of Louisville, Ky., has communicated his belief to the Council, in the shape of a most temperate and carefully prepared paper, that the central portion of the city should be lighted by arc lamps, and suggests that the Louisville Gas Company is the proper corporation to be entrusted with the task. The proprietors of the Company have applied to the Legislature for the necessary change in their charter to enable them to comply with the Mayor's suggestion. If the same is granted (and there is no good cause or reason for thinking that the consent will be withheld) the Gas Company will be guranteed an exclusive right for maintaining public arc lights, although the supply of commercial lights shall yet remain open to competition.

[Official Report—Revised by the Secretary.]

Nineteenth Annual Meeting, New England Association of Gas Engineers.

Held at Young's Hotel, Boston, Mass., February 20 and 21, 1889.

First Day—Wednesday, Feb. 20—Morning Session.

The New England Association of Gas Engineers held its Nineteenth Annual Meeting, at Young's Hotel, Boston, on Feb. 20 and 21, 1889, the President, Mr. A. M. Norton, in the Chair. The first session began on Wednesday, Feb. 20, at 10 A.M. On motion of Mr. Stiness, the reading of the minutes of the last meeting was omitted.

The Chair, having appointed Messrs. A. B. Slater and H. A. Allyn a committee to invite visitors to seats in the convention, the following gentlemen were introduced and welcomed by the President:

F. E. Barker.	F. W. Floyd.	W. Mooney.	P. W. Sprague.
J. S. Bush.	W. W. Goodwin.	W. McDonald.	F. R. Sprague.
C. W. Blodget.	G. W. Graeff, Jr.	F. H. Odiorne.	F. H. Shelton.
T. V. Church.	G. F. Kreischer.	J. D. Perkins.	G. W. Stephens.
W. H. Down.	T. G. Lansden..	I. N. Stanley.	W. H. White.
E. J. Enfer.	E. Lenz.	C. H. Sprague.	O. B. Weber.

Applications for and Election to Membership.

Applications for membership were received from the following-named gentlemen:

Active Members.

W. T. Sanborn, Dover, N. H.	George T. Goodno, Dedham, Mass.
W. P. Addick, Boston, Mass.	Henry H. Kelly, Greenfield, Mass.
Robert Amory, Brookline, Mass.	George F. Macmun, Natick, Mass.
H. N. Biglow, Clinton, Mass.	Louis Malm, Marblehead, Mass.
Isaiah E. Coffin, Nantucket, Mass.	A. B. Slater, Jr., Providence, R. I.
Samuel J. Fowler, Westfield, Mass.	W. A. Stedman, Jr., Hartford, Conn.

Associate Members.

Cyrus M. Coburn, Chelsea, Mass.	Nathaniel Tufts, Boston, Mass.
F. J. Davis, Waltham, Mass.	Charles S. Waldo, Boston, Mass.
C. H. Gifford, New Bedford, Mass.	J. A. Waldo, Boston, Mass.
Nat. Gifford, New Bedford, Mass.	Rufus E. Holmes, Winsted, Conn.
G. E. Kenyon, Jamaica Plain, Mass.	R. R. Smith, New Hartford, Conn.
F. Tobey, Jr., New Bedford, Mass.	

Having been approved by the Board of Directors, the Secretary was instructed to cast the ballot of the Association for the gentlemen named, and they were thereupon declared duly elected members of the Association, and were introduced to the Association by the President.

Roll Call.

Upon the call of the roll the following members responded to their names:

Honorary Members.

Jos. R. Thomas, New York City. Fred. S. Benson, Brooklyn, N. Y.
Eugene Vanderpool, Newark. N. J.

Active Members.

C. T. Frost, Rockland, Me.	M. S. Greenough, Boston, Mass.
A. H. Parker, Bangor, Me.	J. L. Hallett, Springfield, Mass.
Wm. Badger, Concord, N. H.	E. Hassett, Beverly, Mass.
Wm. D. Cadweli, Nashua, N. H.	C. J. R. Humphreys, Lawrence, Mass.
H. S. Chase, Great Falls, N. H.	M. Jewitt, Clinton, Mass.
A. F. Cooper, Exeter, N. H.	E. C. Jones, Boston, Mass.
J. M. Hill, Concord, N. H.	C. D. Lamson, Worcester, Mass.
A. M. Norton, Nashua, N. H.	H. B. Leach, Taunton, Mass.
F. H. Parker, Burlington, Vt.	W. A. Learned, Newton, Mass.
H. A. Allyn, Cambridge, Mass.	R. J. Long, Salem, Mass.
Wm. Anderson, Marlboro', Mass.	R. J. Monks, Woburn, Mass.
John Andrew, Chelsea, Mass.	D. Moore, Salem, Mass.
H. A. Atwood, Plymouth, Mass.	G. B. Neal, Boston, Mass.
G. D. Bill, Malden, Mass.	H. A. Norton, Boston, Mass.
F. C. Blood, Ware, Mass.	C. F. Prichard, Lynn, Mass.
D. Boynton, Chicopee, Mass.	J. F. Rogers, Boston, Mass.
J. H. Burnham, Boston, Mass.	W. H. Snow, Holyoke, Mass.
G. D. Cabot, Lawrence, Mass.	C. S. Spaulding, Brookline, Mass.
J. A. Coffin, Gloucester, Mass.	J. Q. A. Spear, Dorchester, Mass.
H. F. Coggshall, Fitchburg, Mass.	W. K. Stratton, Haverhill, Mass.
P. Coyle, Boston, Mass.	R. B. Taber, New Bedford, Mass.
D. W. Crafts, Northampton, Mass.	A. W. Tarbell, Boston, Mass.
O. E. Cushing, Lowell, Mass.	W. Tarbell, Waltham, Mass.
A. M. Copp, Boston, Mass.	D. D. Tilton, Newburyport, Mass.
F. R. Davis, Athol, Mass.	L. W. Wells, Boston, Mass.
G. E. Wetherbee, Worcester, Mass.	W. A. Stedman, Newport, R. I.
G. Wood, New Bedford, Mass.	S. G. Stiness, Pawtucket, R. I.
W. A. Wood, Boston, Mass.	J. P. Harbison, Hartford, Conn.
R. Woodward, Waltham, Mass.	E. C. Learned, New Britain, Conn.
Z. M. Jenks, Woonsocket, R. I.	C. H. Nettleton, Birming'm, Conn.
J. H. Manchester, Bristol, R. I.	F. C. Sherman, New Haven, Conn.
A. K. Quinn, Newport, R. I.	J. R. Todd, Middletown, N. Y.
A. B. Slater, Providence, R. I.	C. F. Warren, Manchester, N. H.

Associate Member.

F. P. Fairbanks, Manchester, N. H.

The President, the Hon. A. M. Norton, then read the following address:

PRESIDENT'S ADDRESS.

Gentlemen of the New England Association of Gas Engineers:

We are again assembled in annual meeting for the purpose of consultation as to the best means and modes of preserving, extending and improving the interests of that great industry with which we are so intimately connected. A time-honored custom seems to require that on these occasions your presiding officer should present a brief address that may serve as a preface to the more interesting and important subjects which are to follow.

The first and most pleasant duty which falls to my lot is that of welcoming you one and all to another meeting, and congratulating you upon the prosperity which the companies that we represent have enjoyed almost, if not quite, without exception during the past year. There are few industries in existence which have afforded a better investment, when tried by the double standard of safety and of dividend; and whether in the future the prosperity of this great industry is to be diminished or increased depends, in a great degree, upon the members of our profession, here and elsewhere.

We have this day assembled to compare observations, experiences and results, hoping that from this mass of our collected knowledge we may gather that which will be the most useful and, therefore, the most valuable. And the benefits that flow from this Association are not confined to the regular proceeding, but are derived largely from the informal social intercourse of members. There is no man, however humble, whose experience does not include some fact unknown to all others. And in these private conversations points are brought out, information gained, and difficulties removed that are not, and cannot be, reached by the regular order of our proceedings. And at present it especially behooves us to take earnest public and private counsel with each other. The time has passed when a gas company can demand such a price as will yield the profit desired, and collect it without difficulty. First of all we must accommodate ourselves to the new demands which are now made upon us, and meet with cheaper or better light our competitors in the race for public favor.

It is not my purpose nor my province to discuss in detail the relative merits of gas and electricity for lighting—that subject will be presented most ably by another—but only to offer some suggestions upon the present conditions of the problem with which we are confronted.

Many of us will recall that a few years ago, under the influence of the claims put forth by the enthusiastic advocates of lighting by electricity, public confidence in gas stocks was seriously impaired, and many of our own number had grave doubts as to the future well being of the gas industry. Time has greatly moderated the extravagant pretensions of the one class and the fears of the other, and to-day the relative merits and capabilities of both are better known by that best of all tests—experience. We, as gas men, must recognize the fact that if the present conditions of both of these illuminating agents remain the same, lighting by electricity has come to stay; for under certain conditions of place—as theaters, public buildings, squares and streets—it is a better light than can be furnished by gas to-day. But in the essential elements of cheapness, reliability, and adaptation to general use, gas retains a decided superiority over electricity. And notwithstanding the great number of electric light plants that have been established everywhere, it would be difficult, and I think impossible, to point out a single city or town in which the consumption of gas for lighting is not steadily increasing year by year. The electric lamp can hardly be found in a private house to-day, save in those few palatial residences that great wealth has erected. But even here gas will be found side by side, and I do not know of a public building of any description that has been erected, whatever the appliances for electric lighting, that does not contain gas pipes also.

Undoubtedy in the future, as in the past, great improvements will be made in the development of gas and electricity as illuminating agents. In reducing the cost of gas, in improving its quality, in perfecting its distribution, and in utilizing the waste products, much has been and

more probably will be accomplished. Still, after all, I apprehend that this consideration is but a small factor in the rivalry between gas and electricity, and that the decisive victory for the one or the other as an illuminating agent is to be won upon an entirely different field. That field is largely comprised in inventions and improvements in burners and lamps. And here we, who represent the interests of gas, with our somewhat conservative ideas may learn a great lesson from our over sanguine, perhaps, but certainly energetic rivals. For the past ten years some of the brightest minds in the world have given their entire energies to the development and improvement of the electric light, and as a result the electric lamp of to-day is two or three times as efficient as that of 1878. This fact alone has made possible the competition between gas and electricity. But the gas burner of to-day, in well nigh universal use, is the same as that of ten years ago, and, with perhaps a single exception, there has been no marked improvement in the new burners which have successively sought public favor. And yet, upon the authority of one of the most eminent scientists in this country, in our ordinary gas burner we consume 200 units of available energy to obtain one unit of such energy in the form of light.

Here is the key to the whole situation. Here is the field in our interests for improvement and invention. To this point we should direct our observations, our inquiries, and our best energies. And might it not be well (I make it barely as a suggestion) if the gas companies of this country, with their great capital, should offer some pecuniary inducement to inventors and scientists to produce a burner that shall utilize that immense force in gas which is to day lost.

Gas and electricity thus stand face to face, competitors for public favor. That competition should be manly and generous; for neither has anything to gain by depreciating or underrating the merits of its rival. On the contrary, in this wide world of ours there is opportunity enough and need enough to tax all the capabilities and resources of both. The day is not far distant when public sentiment will demand in all of our smaller cities that the streets be lighted the entire night, and if this lighting follows the moon, the increased cost will not probably exceed 15 per cent. the sunset and twelve o'clock lighting, if gas engines are used. And so far from their being any hostility or rivalry, prejudicial to the interests of stockholders, between gas and electricity. I know of no good reason why a gas company should not furnish electric lights where they are needed. Some, perhaps, would not agree with me in this opinion, but it will, I think, be admitted that the current expenses of one corporation will be less than those of two, and if gas engines are used to supply the motive power, we shall have the most efficient and economical electric plant possible. Undoubtedly to this union some will apply the word "monopoly," or perhaps even a harsher term. And yet only by serving our respective communities to the best of our ability can we strengthen or improve our own condition; for the good will that exists between producer and consumer is the most efficient means of benefiting both.

But, secondly, illumination is only one of the two great uses to which gas may be applied, and, without doubt, many others await discovery. There is the broadest field inviting our cultivation in the use of gas for heating, cooking, and—as a source of limited power—in manufacturing establishments. In the single city of Providence, R. I., there are a thousand gas stoves in use. And when we consider that, for cooking and heating, gas is as cheap as coal, and beyond all comparison the cleanest and most convenient form of fuel known, pure fuel from which has been removed dust, ashes, and clinkers, which can be kindled in a moment and extinguished as rapidly, and when we add to these domestic uses the gas engine with its peculiar adaptability to small manufacturing and industrial establishments—who can predict the possibilities of the future of gas in these directions?

It required years of hard and persevering labor to overcome the prejudice against the use of gas for illumination and to establish it firmly in the popular favor. So in this new departure, we must meet and overcome the prejudices, the objections, and the obstacles that beset every innovation and lie in the pathway of all progress. The time necessary to accomplish this will depend much upon ourselves and our methods. It will be well for us to lay aside our conservative ideas and our professional reserve, to summon to our aid that most efficient ally, printers' ink, and to impress upon the public that we have something worthy of their attention; in short, to display the energy and employ the means which, in this age of sharp competition, are absolutely essential to the success of every business enterprise.

Quite possibly in the immediate future the labors of some one of the many experimenters in this direction may be crowned with success in the production of a fuel gas that shall be even better adapted to these purposes than illuminating gas.

Notwithstanding the competition of electricity, it is probable, almost certain, that with our increasing population and increasing wealth, the consumption of gas solely for illumination will steadily increase year by year. But even if in the future electricity should displace gas to some degree as an illuminant, and absolutely lessen its consumption for this purpose, the new uses which I have indicated, if they are pressed and developed with energy, will far more than compensate for any loss in this direction. Such is the lesson of all history. A mob attempted to destroy the first labor-saving machine invented in England, for fear that wages would be lessened thereby. The hack drivers of this and of other cities opposed the location of street railways upon the ground that it would destroy their occupation. Fifty-six years ago, one of the ablest lawyers in New England appeared at the State House in this city to defend the petition for a charter of a railroad from Boston to Salem, which was opposed by some, who thought if constructed it would injure turnpikes, and by others who urged that it would render horses worthless. But the average wages of the laboring man in England are to-day about twice what they were when the first labor-saving machine was invented. Neither hackmen nor herdic drivers have decreased in number or prosperity, but they still ply their vocation so rigorously that the problem with many an anxious foot passenger is how to avoid being run down; and any of us who have occasion to buy a good horse will find that our many railroads have not yet seriously impaired the price.

There are fears and criticisms more valuable than hopes and praises; for they lead to the highways of safety and prosperity. And if the advent of electricity as an illuminant shall be the cause or occasion of the invention of a burner that will utilize more of the heat units in gas, if it shall tend to extend the use of gas to domestic and manufacturing purposes, so far from being an enemy, it will have conferred the greatest benefit not only upon the interests that we represent, but upon the entire community.

In the midst of our congratulations upon the prosperity of the past and the bright prospects for the future, there fall the dark shadows of sorrow. Two chairs are vacant. The continued ill-health of Mr. J. H. Rollins, of Worcester, Mass., will not permit his attendance upon our deliberations. Deeply we regret his absence, and we cherish the hope that with health and strength restored he may return to assist us with his presence and his counsel.

The other chair is vacant, to be filled no more. Upon the 30th of July last, Mr. Samuel Fowler, of Westfield, Mass., passed away. In the midst of our grief for his loss, the memory of his refined nature, of his broad culture, and of his many virtues, will remain as an inspiration to us all. The preparation of some fitting memorial should be entrusted to those of our number who knew him so well.

In conclusion, gentlemen, allow me to express my acknowledgment of the great honor which you have conferred upon me, to ask your assistance in the discharge of the duties before me, and to indulge the hope that this the Nineteenth Annual Meeting of our Association may be as eminently successful as were its predecessors. (Applause.)

Treasurer's Report.

The following report of the Treasurer was read, approved, and ordered placed on file:

1888.	*Receipts.*		
Feb. 15.	Balance		$279 12
	Received for dues	$294 00	
	Received for admission fees, meeting 1888	45 00	
			339 00
	Interest from Derby Savings Bank		32 92
	Drawn " " " "		100 00
	Total receipts		$751 04
1888.	*Expenditures.*		
Feb. 15.	Expenses of meeting, Feb., 1888		$178 20
July 25.	Expenses of meeting, July, 1888		309 15
	Printing, $6.75; postage, $20.67		27 42
	Expenses in connection with Methven standard		43 50
	Charles H. Nettleton, salary for 1888		100 00
	Balance		92 77
	Total expenditures		$751 04
	Permanent fund deposited in Derby Savings Bank, of Birmingham, Conn		$600 00

Birmingham, Conn., Feb. 15, 1889.

Charles H. Nettleton, Treas.

We hereby certify that we have examined the Treasurer's accounts, and find the same to be correct. Henry B. Leach, W. A. Wood, } Auditing Committee.

Report of Board of Directors.

The Board of Directors make the following recommendations for adoption by the Association:

1st. That Fred. S. Benson, of Brooklyn, N. Y., and Eugene Vanderpool, of Newark, N. J., be elected Honorary Members of this Association.

2d. That after this meeting the Association employ its own stenographer, and give a copy of the proceedings to such journals as may apply for the same, at prices to be determined by the Secretary.

On motion of Mr. Harbison the report of the Committee was accepted. The first recommendation of the Committee was then, on motion of Mr. Harbison, unanimously adopted, and Mr. Benson and Mr. Vanderpool were declared elected Honorary Members of the Association.

The President—It affords me great pleasure, to notify you of your election as an honorary member of this Association, and to welcome you among us.

Mr. Benson—Mr. President, and Members of the New England Association: This distinguished mark of your consideration and esteem, following so closely upon the very kind letter of invitation to be present as a guest of the Association at this meeting has nearly overpowered me. I am sure I do not know what I have done to merit so much of respect and confidence at your hands. It has been my pleasure and privilege to have met with you nearly every year for the past 15 or 16 years, and it has always been a great source of happiness to me to meet here so many of my personal friends. The meetings of the Association have been among the pleasantest episodes of my life. I assure you I appreciate this mark of your kindness from the bottom of my heart, and shall continue to feel the warmest interest in the welfare of the New England Gas Association.

The President—The second recommendation is that this Association shall hereafter employ its own stenographer. What action will the Association take upon that recommendation?

After considerable discussion this resolution was referred back to the Directors for reconsideration.

Appointment of Special Committees.

The President appointed the following special committees:

Nominating Committee.—Messrs. A. B. Slater, F. C. Sherman and O. E. Cushing.

Memorial Committee.—Messrs. J. L. Hallett and D. W. Crafts.

A Suggestion.

Mr. Stiness—I wish to make a suggestion to our Secretary. I find in the list of our members that the names of a great many are not given in full. Of course, the Secretary, in preparing this list, has followed precedent; but it would be very agreeable to me, as doubtless it would be to many others, if we might know the names of all our members.

Reading the Papers.

The President—If there is no other routine business to come before the Association at present we will now listen to the reading of the papers.

Mr. E. C. Jones (Boston, Mass.) read his paper on—

THE ELEMENTS OF GAS ANALYSIS.

The value of gas analysis and a knowledge of the component parts of illuminating gas has long been recognized by managers of gas works.

The earliest methods were practiced by a few chemical experts, with imperfect apparatus, defective reagents, and unsatisfactory results, until the researches of Bunsen developed valuable improvements, which made it possible to obtain results unexcelled in any other branch of analytical chemistry.

The method of Bunsen is to confine a measured quantity of gas over mercury and determine the volume of the various constituents by the introduction of solid reagents, or by combustion. This method is extremely accurate, and the manipulation is not difficult; but it is a tedious process, requiring much time—even a simple analysis requiring some hours for its completion. Various modifications by Regnault and others embrace tubes for measuring the gas, and other tubes for absorption, enabling the transference of the gas from one tube to the other, and the use of liquid reagents. None of these agents are adapted to the requirements of the gas works, and where used they have been placed in the hands of a chemist, who, as a general rule, arrives at most accurate results, just as the gas engineer has forgotten what he wanted them for.

Among the ever changing conditions of gas manufacture—conditions in the processes of condensing, washing and purifying, some of which are, as yet, but little understood, and may be termed phenomena—a gas analytical apparatus is of great value, and if it combines simplicity, accuracy and economy of time, it becomes indispensable. By it we are enabled to quickly determine the amount of carbonic acid present in the finished gas, or at any stage of its manufacture. We may know if air is being drawn in by the exhauster. A simple analysis will determine the efficiency of ammoniacal liquor of different degrees of strength as a scrubbing and purifying agent. In mixing coal gas and water gas it is essential that frequent analyses be made, and the relative amounts of carbonic oxide and illuminants apprise us of the thoroughness of the mixing process. The analysis of furnace gases from the benches or boilers is useful in determining the efficiency of the furnace.

As the use of gas for cooking, heating and motive power increases, a knowledge of the composition of the gas sent out each day is of importance, and oftentimes protects the gas company against imperfect gas engines, where failure to develop power is attributed to the presence of inert gases, such as carbonic acid and nitrogen. And the gas engineer may readily calculate the heat evolved and the amount of oxygen theoretically required for complete combustion of a given quantity of the gas.

Among my first experiences with gas analysis was the use of the Cooper's tube, but the results obtained were unreliable, and the use of the tube necessitated immersing the hands in water fouled with reagents.

The demand for apparatus combining simplicity and economy of time without materially sacrificing the accuracy of results, has produced several well-known forms, notably Winkler's and Elliott's; the first has been much used in Germany, and modifications of the second are used in the laboratories of two of the colleges in our own country. In all the forms of apparatus mentioned the reagent is wasted after each absorption, and in some forms it is allowed to mingle in the water in the burette, to which there are serious objections. In the Bunsen apparatus reagents which foul the mercury are not used, but explosion is resorted to, and in using the other forms of apparatus the use of several valuable reagents is denied us, either on account of difficulty in using, or reaction when mixed with water.

This led to the invention of Orsat's apparatus, which consists of a graduated burette, connected by rubber tubing with a level bottle.

The reagents are contained in separate vessels arranged in order, and the gas is forced into these vessels, where the absorption takes place, and is then drawn back into the burette, and the contraction noted. During the summer of 1885 it was my privilege to be associated with Dr. Walther Hempel, of Dresden, in the investigation of water gas in this country, who called my attention to the apparatus for gas analysis invented by him and extensively used in Germany. He kindly devoted much time to teaching its uses and proper manipulation. The Hempel apparatus possesses all the desirable features of the modified Orsat apparatus, and combines with it a greater range of usefulness and a lessened liability to error.

It is not the object of this paper to speak in derogation of any of the various and useful methods of analyzing gas, but to speak of a method that is like an old friend to me, that improves upon acquaintance, and that I would like you all to become acquainted with. The apparatus includes a glass measuring tube set perpendicularly in an iron base. At the top the tube is drawn out and ends in a small capillary, and at the bottom is a small side tube. The graduations on the measuring tube begin at a point near the base, with zero, and from this point to the end of the capillary, the tube holds 100 c. c., divided into fifths, each fifth representing two-tenths of one per cent. of the graduated contents.

A level tube of about the same capacity as the measuring tube, is open at the top and is similarly set in an iron base, and is provided with a side tube at the bottom. The side tubes are connected by about three feet of rubber tubing, which permits the level tube to be raised and lowered. The reagents are contained in glass pipettes mounted on wooden stands, and a pipette is provided for each reagent.

A nearly even temperature should be maintained in the room in which gas is analyzed, and the water, reagents and apparatus should be at the same temperature as the room. Care should also be used in handling the burettes and pipettes not to allow the hands to come in contact with the glass; to avoid this is one purpose for which the base and wooden stands are provided.

For ordinary analyses carried as far as hydrogen determination, no correction of volume for temperature and pressure is necessary.

As a conflicting liquid, in the burettes, water is employed, and in support of this practice let me quote an eminent authority. Dr. Winkler, in his "Hand-book of Tenchnical Gas Analysis," page 3 of the introduction, says: "As confining-liquid we always employ pure water whenever practicable. Mercury should be avoided as far as possible; glyceriene and fatty oils, which do not offer the least advantage, but many inconveniences, must be entirely avoided."

If it is desired to annul the error caused by the absorption of gases by water, previous to filling the burettes, take a half liter wash bottle partly filled with water, connect it with a rubber gas tube, allow the gas to

bubble through the water for some minutes, frequently shaking the bottle to bring the water in contact with the gas. This reduces the absorptivity of the water, which may then be used for filling the burettes. The Hempel pipettes are adapted to the use of any reagent. I have selected the most approved, and convenient for the gas engineer, and will speak of them in the order in which they should always be used.

For the absorption of carboinc acid a simple tubulated pipette is used. The pipette is filled with small rolls of wire gauze, and a strong solution of caustic potash in the water. The wire gauze, wet with the potash solution, presents a large scrubbing surface to the gas and quickly removes all carbonic acid.

For the absorption of illuminants, a pipette having a bulb full of glass beads, and filled with fuming sulphuric acid is used. Fuming sulphuric acid (sometimes called Nordhausen sulphuric acid) on exposure to the air evolves dense white fumes. When used as a reagent it effectually removes olefiant gas together with all other illuminants.

This is not accomplished with bromine, as it acts with difficulty, if at all, on the hydrocarbons, and a more energetic reagent is required. I have been led to attribute the discrepancy between the proportion of illuminants and the candle power when using bromine to the fact that the most valuable light-giving properties of the gas are not absorbed by bromine. Care must be taken not to allow water to pass over into the sulphuric acid pipette. After the absorption of illuminants by fuming sulphuric acid the gas should be passed over into the potash pipette to remove the acid fumes.

A simple tubulated pipette filled with sticks of phosphorus in water is used for oxygen determination. The gas conveyed over into the pipette displaces the water and comes in contact with the phosphorus. If oxygen is present in the gas oxidation takes place with the formation of phosphorus acid, filling the portion of the pipette occupied by the gas with white fumes, and in the dark the pipette shows bright phosphorescence. Where much oxygen is present it is well to observe this phosphorescence, for when it ceases we know the absorption is complete.

After drawing the gas back into the burette it should be passed into the potash pipette to remove the acid vapor. Phosphorus absorbs oxygen quickly at a temperature of 68° Fah., or higher, and slowly until the temperature is reduced to 59°—at lower temperatures than 59° the test is not reliable; yet this fact is hardly an objection to its use, as a higher temperature than 59° F. is maintained in most laboratories. When not in use the phosphorus pipette should be kept in a dark place (a tin box serves the purpose well), as by the action of light phosphorus is slowly converted into red or amorphous phosphorus, and in this state is inoperative. It may be said on good authority that the estimation of carbonic oxide is not affected by the use of phosphorus for removing oxygen. (Winkler-Lunge.)

A compound pipette, consisting of four connecting glass bulbs, is used for carbonic oxide estimation. Two of the bulbs contain a solution of cuprous chloride in hydrochloric acid, while the other two contain water, forming a water seal to protect this sensitive reagent from the oxidizing effect of the air. A spiral of copper wire should be kept in the bulb containing the reagent. As the absorption of carbonic oxide is comparatively slow the gas should be passed into the pipette, the pipette disconnected and stopped by a glass plug and gently shaken for three or four minutes. After absorbing carbonic oxide, the vapor of hydrochloric acid should be removed by passing the gas into the potash pipette.

To make the solution of cuprous chloride in hydrochloric acid, place about two ounces of black oxide of copper and a few spirals of copper wire in a quarter liter flask, pour in hydrochloric acid until the flask is full, then cork tightly and allow it to stand for two or three days.

In the year 1866 Graham discovered that metallic palladium possessed the power of absorbing hydrogen; he found that a palladium wire, at a red heat, would absorb 935 times its volume of hydrogen, and at ordinary temperature it would absorb 376 volumes of the gas. (*Proc. Roy. Soc.*, XV., 223).

It was afterwards discovered that "when a warm palladium foil is brought into an electrolytic mixture of hydrogen and oxygen, or other explosive gaseous mixture, combination takes place without explosion." (*Compt. Rendus*, lxxxiii., 709).

Hempel has ingeniously made use of these facts by constructing a simple U-shaped combustion tube, loosely filled with fibers of asbestos, through which is mixed finely-divided palladium. This combustion tube is placed between the Hempel burette, and a simple absorption pipette filled with water. and it may be heated by means of a small alcohol lamp. To estimate the amount of hydrogen by this method, take about 20 c. c. of the gas remaining in the burette after the absorption of carbonic oxide, carefully note the volume, and by lowering the level tube draw air into the burette until the mixture occupies nearly, but not quite 100 c. c.

Note the volume of the mixture, then place the palladium-tube between the burette and simple pipette, gently heat the palladium-tube and pass the gas through it. The asbestos fibers nearest the burette will become heated and glow. Care should be used not to allow any water to pass into the heated palladium tube, as it would be apt to break it. After passing the gas two or three times through the palladium-tube, all the hydrogen will be burned.

Carefully note the contraction, and two-thirds of this contraction is the amount of hydrogen in the gas used for the experment. The percentage of hydrogen in the original volume may be easily known, as follows: Suppose the volume of gas remaining in the burette after the absorption of carbonic oxide was 80 c. c. The amount of this gas used for the experiment was 20 c. c., and the contraction due to burning the hydrogen 18 c. c. Two thirds of the contraction would be 12 c. c., $\frac{12}{20}$ of the gas experimented with was hydrogen, so $\frac{12}{20}$ of the gas remaining after the absorption of carbonic oxide must have been hydrogen, $\frac{12}{20} \times 80 = 48$ per cent. hydrogen in the gas.

For the accurate estimation of marsh gas a correction of volume to standard temperature and pressure is necessary. An explosion pipette is provided as a part of the Hempel apparatus, in which a portion of the remaining gas (consisting of hydrogen, marsh gas and nitrogen) is introduced, together with air, and after passing a spark, the carbonic acid present, as a product of the combustion, is removed by conveying the gas into the potash pipette. The amount of carbonic acid is exactly equal to the amount of marsh gas.

Nitrogen is unaffected by any of the reagents used, and in every case is a residue, and its volume is estimated by difference.

I have recently designed a new form of specific gravity apparatus, by adapting the Hempel gas burette to the Schilling effusion test. By this method any one having a pair of burettes may take the specific gravity of gases by the use of a small glass tube ending in a platinum tip having a small hole through it. The entire cost of the tip is but a few cents, and results are obtained with this simple device which are as nearly correct as by the more expensive and complicated effusion tests.

You are all undoubtedly familiar with the several forms of apparatus employed for testing for specific gravity, and will readily appreciate the facility with which gas or air may be drawn into the burette by lowering the level tube, and by placing the level tube on the wooden stand, a head of water is provided to force the gas or air through the platinum tip. The application of a cheap and simple tip to a gas burette will be found to be more convenient than other methods, and will tempt the gas analyst to add the specific gravity of the gas to the results of his analysis.

Discussion.

Mr. Taber—I would like to ask Mr. Jones what difference he finds between the quantity of illuminants shown by the Hempel and by the other methods.

Mr. Jones—I tried some experiments with Dr. Hempel when in this country to determine this, but I do not remember the exact difference.

Mr. Taber—I hoped that Mr. Jones would give us some additional light upon the question of the relation between the illuminants, specific gravity, and candle power.

Mr. Jones—In writing the paper I had that very matter in mind, and referred to the figures which you had prepared and distributed at our last meeting.

Mr. Taber—I hoped you would have found where our error was.

Mr. Coggshall—How long do those reagents last?

Mr. Jones—I find when using the Hempel apparatus daily the burettes need refilling about once a year.

Mr. Taber—Has it ever occurred to you to have a blue burette surrounding the phosphorus, instead of the ordinary plain glass?

Mr. Jones—No; but I think that it would be an excellent idea. The phosphorus is partly affected now by exposure to daylight.

Mr. Taber—A blue glass around it might make it last longer.

Mr. Jones—I have had no trouble with it. I keep it in my photometer room, which is generally dark.

Mr. Prichard—Is Mr. Jones perfectly satisfied with the palladium method of observing the hydrogen. We have a similar apparatus, but have not obtained results which satisfied us.

Mr. Jones—I found considerable trouble with it at first. I bought a combustion tube in New York, filled with black palladium, but afterwards obtained some of the palladium asbestos, and had some combustion tubes made which gave excellent satisfaction. I sometimes have, in testing, a larger amount of hydrogen shown than ought to be present, and I have attributed it (and have found it to be so) to the fact that I had

not used the necessary care in absorbing the carbonic oxide and illuminants: and that my palladium had burned out some of the illuminants and carbonic oxide, as well as hydrogen, which were left in the gas, and therefore gave me a larger percentage of hydrogen.

Mr. Prichard—We took the direction from Hempel's book, and passed the whole amount through the palladium tubes. Perhaps we gave them too much work to do. I notice you took only one-fifth the amount that we took.

Mr. Jones—I took only 20 cubic centimeters.

On motion of Mr. Taber, the thanks of the Association were voted to Mr. Jones for his able paper, and very complete exposition of the method.

Mr. J. L. Hallett (Springfield, Mass.) read his paper, entitled

LIMA CRUDE OIL VERSUS CANNEL COAL.

Assuming that the object of our annual meeting is to obtain information and facts which may be both of interest and practical value to members of the Association, and that it is expected of its members to give as well as to receive such items of interest concerning the manufacture of gas that may come under their observation, I here present the result of some experiments in using Lima crude oil for enriching purposes versus cannel coal.

We theorize much on the subject of gas making, and, according to ability and circumstances, verify our theories by practical application. Thus it has been with this much abused oil, and while some may condemn and others advocate its use, it is to provoke discussion and get the experience of others that the subject is presented.

We commenced the use of Lima oil from necessity, and not from choice. It happened in this wise. In the winter of 1887 we were persuaded that theoretically there was a great saving in the use of oil over solid fuel for generating steam, and to prove the statements then made we consented to the trial. A battery of seven boilers was fitted up with the necessary piping, air and oil receiver, pump and engine. Several tests were made, but the results did not confirm the theory, owing, we think, to insufficiency of the machinery, or other cause which could not be determined. This fortunately left us with considerable oil on hand—I say, fortunately, for the river being then closed to navigation we could not then get our usual complement of cannel coal—and, as an expedient, the oil was turned into the retorts.

Methods first employed in handling the material were as crude as the oil. The stench was fearful. In strength and penetrating power it was fully equal to that of attar of roses, although not as sweet; in fact, it was little better than a nuisance, so much so that families living in the vicinity of the gas works entered complaint, as did the newspapers. There were other discouragements, such as lampblack, excess of tar, etc. The results, however, were so surprisingly good that we disliked to abandon it, and finallly succeeded in overcoming all objectionable features.

Without mentioning in detail the experimental methods, I would say that the oil is received in tank cars, emptied into a large reservoir, which is buried in the ground, then pumped into an iron tank of 200 gallons capacity, which is located in the retort house at an elevation of 20 feet above the floor, thence the oil flows by gravity through 1¼ inch pipe to the bench, and is there injected into the retort, by a jet of steam, through a ½-inch tube. At no point is the oil exposed to the air, hence, there is no noticeable odor from it about the works. Inside the retort is laid a 2-inch pipe, 7 feet long, open at farther end, and at this point the oil gas is discharged into the retort, thence to the hydraulic main, where it mixes with the coal gas. The ½-inch oil and steam pipe connects with the 2-inch just inside the mouthpiece. This plan appears to work the best of any we have tried. The benefits are manifold.

1st. The candle power of the gas can be maintained at any desired point by increasing or diminishing the supply of oil, as the case may require.

2d. Freedom from naphthaline in the works, street mains and services.

Heretofore there were many complaints, especially in the fall and winter months, caused by naphthaline in the pipes and meters, and occasionally stopping the inlet and outlet to holders. In the last 12 months these have wholly disappeared, effecting a saving in labor, alcohol, and considerable annoyance. It has cleansed and cleared the larger mains about the works of a hard, tarry substance, the accumulation of years. This was dissolved by the oil and carried forward to the tar well and center seal, relieving the exhauster; and there has been less back pressure, notwithstanding a larger output than in any previous year. The financial results have also been gratifying. We have no other means of knowing what that has been than by comparison.

In the month of January, 1883-84-85-86-87, when using 93 per cent. Youghiogheny coal and 7 per cent. cannel, the average yield was 5.04 cubic feet per pound of coal, equal to 11,290 cubic feet per ton. January, 1889, using all Youghiogheny coal and 5½ gallons of crude Lima oil per ton of coal carbonized, the average yield was 5.33 cubic feet, equal to 11,939 feet per ton of coal. In comparison, this gave 118 cubic feet (mixed oil and hydrogen) to each gallon of oil used. The average candle power of the gas in 1883-84-85-86-87 was 17.91. The State inspection of 1889 was 19.4 candle power, but we think the average for the month should be 18.5 candle power. The oil costs 2¾ cents per gallon, and as an enricher estimate a saving of 55 cents per ton of coal over cannel coal, at $12 per ton. A year's trial confirms this statement.

I will only add that the oil gives to the gas a white color, which is a character in water gas, but not as diffusive as the rich orange color in pure coal gas.

Discussion.

Mr. Neal—How does Mr. Hallett inject the oil into the retort—through the lid or by using some other means?

Mr. Hallett—Through the mouthpiece with a half-inch pipe, connected inside with a 2-inch pipe running back into the retort and discharging at the end of 7 feet. We have nothing in these retorts except the 2-inch pipe.

Mr. Coggshall—Is there any complaint from consumers about smoky gas?

Mr. Hallett—Not at all.

Mr. Coggshall—I have had very serious trouble in that respect.

Mr Hallett—In looking over the complaint book for the year, for all cases of complaint previous to our using Lima oil, and for the complaints since we used the oil, I find that the complaints from all sources are reduced one-half. I am not satisfied that we are using this oil to the best advantage, and one object I had in presenting this paper was the hope of a discussion which might be a benefit to us, and also that it might perhaps give information which will be of use to some who have not used the oil.

Mr. Chase—Has Mr. Hallett noticed any change in the purifiers?

Mr. Hallett—No change at all. Last year we purified about 19,000 cubic feet of gas to a bushel of unslacked lime; and we purified 20,000 feet the year before.

Mr. Anderson—What is the life of this 2-inch pipe in the retort through which the oil is injected?

Mr. Hallett—From two to three weeks.

Mr. Anderson—Is the retort one of the bench which you charge with coal?

Mr. Hallett—Yes; the lower retort.

Mr. Stephens—Are you troubled with lampblack?

Mr. Hallett—No. I did not give in detail the manner in which we formerly used it. During the first six months of our experimental use of Lima oil we got lampblack; but as we use it now we have no lampblack. I do not think that we have much tar.

Mr. Neal—Do you inject the oil continuously throughout the 24 hours?

Mr. Hallett—Yes.

Mr. Allyn—Do you use steam?

Mr. Hallett—Yes. We find that if we do not use steam we get lampblack.

Mr. Allyn—Through how large an orifice do you introduce the steam?

Mr. Hallett—About three-eighths of an inch.

Mr. Harbison—Do you find any difficulty in maintaining the heat of the retorts?

Mr. Hallett—Of course, we have to watch carefully, and occasionally try the gas. If we use too much oil or steam we deaden the heat of the retort and produce lampblack. In our experience during the last six months we have had no trouble at all from that source.

Mr. Allyn—Have you used any other variety of petroleum than the Lima oil?

Mr. Hallett—No; we use that wholly. Perhaps it might be of interest to some members who have tried Lima oil, and have not succeeded, to say that at first we got a large amount of tar from our drips around the gas works, and for a time we really did not know where it came from. This escape of tar lasted several months, but finally stopped, and this last winter, although making more gas, the back pressure has been less, showing that our pipes are much freer than a year ago, and I am now satisfied that our pipes are practically clear. The results have been so satisfactory to us that I thought it well to give them to the Association.

The President—I think Mr. Snow can give us some information about the use of Lima oil.

Mr. Snow—Knowing that I had used Lima oil, the Secretary wrote

and asked if I would not come prepared to give the figures; and so I have brought them with me. We have now used it for over a year. The results we have obtained, while not as good as those stated by Mr. Hallett, have been fairly satisfactory. We use it in altogether a different way. We were forced into using it the way we do, because we have steam at our works only during cold weather. I make a cartridge of a 3-inch wrought iron pipe, 4 feet long, plug it at one end, fill it with small pieces of coke, and pour oil into these cartridges long enough before being used to let the coke absorb the oil. Then the open end is plugged with a piece of coke, and luted with clay; and after the retort is charged I throw this cartridge right in on top of the coal. In making some figures for the purpose of comparison I have taken the last six months (ending Jan. 31, 1887) that we used coal and cannel alone, and the six months (ending Jan. 31, 1889) during which we used coal and oil alone. During the first period noted we made 25,926,200 cubic feet, and used 5,216,600 lbs. of coal, of which 4.59 per cent. was cannel. We had a yield of 4.969 feet per pound, or 11,130 feet per ton, with a candle power of 17.9; and the cost of our gas per thousand, for just the material used, was 48.4 cents. For the six months ending Jan. 31, 1889, we made 29,228,900 cubic feet, using 5,537,150 lbs. of coal and 15,611 gallons of oil; or 5.31 gallons per ton. The yield was 5.278 feet per pound, or 11,822 feet per ton. We always reckon our yield on the coal alone, but it has been suggested that this was not a fair method of stating it—allowing 7 lbs. for each gallon of oil, and reckoning it all in as so many pounds of coal; on that basis the yield was 5.175 feet per pound, with a candle power of 18.3, as against 17.9 with coal and cannel; and the cost per thousand feet for material alone was 45.7 cents, as against 48.4.

Mr. Harbison—Did you pay the same prices for your caking coal in each case?

Mr. Snow—Yes. This statement is only as to the material used in each six months. It does not take in anything else, and is stated for the sake of comparison.

Mr. Nettleton—I am inclined to think, after having gone through the Springfield gas works and listened to the statements of Mr. Hallett and of Mr. Snow as to their experience in the use of Lima oil, that those of us who are prejudiced and dyed-in-the-wool coal gas men may have to change our opinions to some extent. It seems to me there can be no possible enricher furnished so cheaply to those of us who manage gas works in New England as this same Lima crude oil. Mr. Hallett's figures, as he told you, were based upon a price of 2¼ cents per gallon. I am informed that at the present time a contract can be entered into for oil at 2¼ cents per gallon. Now, if with the use of 4½ or 5½ gallons of oil we can bring up the gas which we produce from our caking coal to 20-candle gas, or even to 19-candles, we get an enriching material for less than 13 cents per ton of coal carbonized. That must be a great deal cheaper than we can possibly get the same result for from cannel sold in our market. One of our honorary members has said that it is a cardinal virtue in a man not to deceive himself. Now, if Mr. Hallet has not deceived himself (and those of us who know him well do not believe he has), he has made a saving in the year's work of 55 cents per ton of coal carbonized. Is it possible for any of us to make a saving with so little trouble as to change from the use of cannel coal to oil? I would like also to say—not for the purpose of corroborating his statement, because his statement does not need corroborating, but simply to add my testimony—that I went through his works yesterday, and, except in one place in the retort house, I could not detect the odor of this Lima crude oil. Near the pump there was a slight odor, but it was very slight, and not at all offensive. They had to tell me when I was standing over the tank containing the crude oil. It is no more troublesome, and I do not think as troublesome as the use of cannel coal.

Mr. Harbison—I would like to inquire of Mr. Hallett or of Mr. Snow whether they have had any complaint of the odor of the gas where it has been consumed in gas stoves, where they have used Lima oil altogether as an enricher.

Mr. Hallett—We have not had any complaint of the odor from that source. In opening a jet we detect the odor of the oil, but not when burned. There is no trouble from the gas stoves. We have about 1,200 gas stoves out, which are used both for heating and for cooking. In the last year we have sold something over 200 stoves.

Mr. Coggshall—Our experience in the use of oil and the results obtained from its use in connection with steam are something like Mr. Hallet's; but last year I used Lima oil very freely through the winter, and never had so much complaint of smoked ceilings in all my experience in managing gas works. Although I have about 6,000 gallons of oil on hand, I am using cannel coal. I find I can keep the gas more nearly at the same illuminating power with cannel coal than with oil The trouble is that we get it oo rich occasionally, and the result is complaint about smoked ceilings.

Mr. Neal—What kind of cannel do you use?

Mr. Coggshall—The Breckenridge.

The President—Has any other gentleman had experience with Lima oil?

Mr. Prichard—We have used it for a year, with substantially the same results as those given by Mr. Hallett. Previous to that we were using naphtha. I consider the Lima oil the equal of naphtha in the illuminating power that we get from it, and the difference in price at our place is about two cents per gallon in favor of the Lima oil.

Mr. Allyn—Does Mr. Prichard use steam?

Mr. Prichard—Yes; we use the ordinary arrangement of pipes, one inside the other, such as we used for naphtha. I fancy we do not carry into the gas as much vapor with the oil as we used to with the naphtha. I know that sometimes we would get unpleasant results from the vapor of naphtha, but I have seen no such results from the use of Lima oil.

The President—We would like to hear from Mr. Sherman as to his use of Lima oil.

Mr. Sherman—My experience with it has not been sufficiently long to enable me to say very much in regard to it. We have been using it during the last winter, and find that it is a cheaper enricher than cannel coal. We are now making some experiments with it, and I shall be glad to give the members a statement of the results at some future time.

Mr. Snow—I would like to ask Mr. Prichard if those who purchase the coal tar make any complaint of finding oil in the tar?

Mr. Prichard—No; we use the tar ourselves. We make a small amount of water gas, and have had no trouble in using the tar there.

Mr. Allyn—While we have used the various products of petroleum as an enricher for eight or nine years, we have had no complaint whatever as to the quality of the tar. In fact the people who buy our tar say that it gives as good satisfaction for the various uses to which they put it as any they have had. I made some experiments two years ago with Lima oil, and I found, as far as I went with it, that we could not get as good results as we did with the various products of petroleum. The yield fell off and the odor was objectionable. The candle power was also a little lower.

On motion of Mr. Harbison the thanks of the Association were voted to Mr. Hallett for his paper, and to Mr. Snow for his data.

An Invitation from Mr. Greenough.

Mr. Greenough—I wish to say to the members of the Association that we have in use at our Commercial Point Works a charging machine, which weighs the coal and puts it into the retorts; half the coal in the house being handled by machinery. If any of the members can find time to visit the works while they are here, we shall be glad to see them, and to show them the charging machine in operation. At the North End Works we have put in the smaller charging machine which Mr. Ross has gotten up this year for the use of narrow works. We are there running four benches of retorts, and making two or three hundred thousand feet of gas per day by what is known as the "baby process"—a water gas process making gas without carbonic oxide. If any of you would like to see it, we shall be glad to have you visit the works.

On motion of Mr. Harbison, the invitation of Mr. Greenough was accepted, with thanks.

Mr. A. F. Cooper (Exter, N. H.) then read his paper, on

INCIDENTS IN THE LIFE OF A SUPERINTENDENT OF A SMALL GAS WORKS.

Mr. President and Gentlemen:—One of the reasons *why* I presumed to address this Association, was the encouragement I received from Mr. Todd, late of Natick, Mass., who read a very interesting paper at your last meeting, in Boston, a year ago, and showed how a small gas works could be run so as to pay a dividend; another reason (and perhaps you may call it a selfish one) was to encourage the several superintendents of small gas works to continue this good work and be sure and have *one paper* every year from this branch of the Association.

I have in charge a country gas works, situated in the pleasant and classic Town of Exeter, *about* 4000 *inhabitants.* Of course some credit is due me for its prosperity, but to the Treasurer and Agent, Mr. A. M. Copp, more than to any one else, the Exeter Gas Light Company is indebted, for its present standing. I would say here that I succeeded W. H. Frost, who had the works about a year. When he took charge things were in very bad shape. His work on the mains, holder and meters was a start in the right direction.

I took charge in July, 1883, and for the first year the result was: We sent out 2,646,500 cubic feet, by meter; 2,054,900 cubic feet to the street

lights; 211,800 cubic feet; used at the works, 83,000 cubic feet; unaccounted for, 297,800 cubic feet.

Begining with January 1, 1888, for one year we sent out 4,797,100 cubic feet: by meter, 3,841,900 cubic feet; street lights, 506,700 cubic feet; at the works, 86,200 cubic feet; lost 363,300.

Our average yield per pound was 4.64 cubic feet. In July, 1883, meter sales were 62,100 cubic feet; in July 1888 these were 138,800 cubic feet. In January 1884, our meter sales were 269,800 cubic feet, on a yield of 4.46 cubic feet per pound; January 1889, meter sales were 533,500 cubic feet, on a yield of 4.71 cubic feet per pound. The largest month (Dec., 1888), our meter sales were 590,600 cubic feet, on a yield of 4.80 cubic feet per pound. The greatest send-out for any one day was, Dec., 17, 1888, 28,500 cubic feet. We used about 5 tons cannel.

In the management of large, as well as small, gas works, it is quite essential that the holder, mains and services should receive proper attention, and be kept tight. I have my mains divided into two sections, with gates. On each side of gate a ¾ in., pipe is put, coming up in the box, so that we can close the gate and by-pass the gas through a meter, for location of leaks.

When I put in a Tee, or repair a break, I always try the gas on both ends to see if the way is all clear. I once found a drip full of water that I did not know existed.

The meters should receive the closest attention, the average loss being against the Company. When I copy off the statements on the first of the month, I put down any name I think should be looked after, then send a man, or go myself and examine.

How I increase my consumers is as follows: I am in the gas business, have a good thing, and want to sell it. I consider it just the same as I would anything else. For instance, a man is burning oil in his store. I go to him and say, you are doing a good business; you ought to burn gas, and make your place look better, and then call his attention to some one who burns gas. This is seed sown, and is sure to bring fruit. When a new house is being built, I find out who the owner is, go to him and offer to pipe it, for cost. If he does not want it done, I ask him if he is going to live in it; if he says no, I soon find out who is to be the occupant. I have a talk with him, and say, well, I suppose you will burn gas when you move into your house, and try and explain the advantages and comfort he would get from the use of gas. *The result is*, he goes to the owner, owner comes to me, and thinks he will have the house piped, and we get the job.

I found (some) houses piped, but no service. I soon had them in. Another man had a nice house all piped, and ready for meter. I was two years getting him, but he had to come, and now is a good consumer.

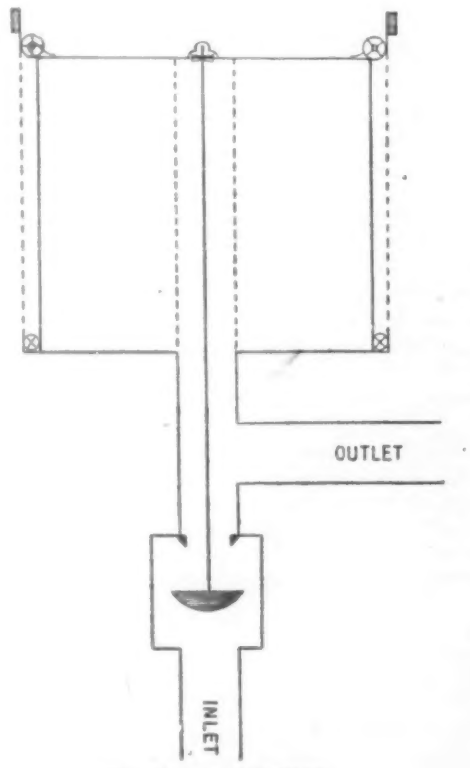
I increased my street lights from 38 to 72 by these means. I made a memoranda of the streets that I thought needed lights, and picked out the ones I wanted to extend mains on, or lay new ones. Went to the residents that paid the most tax, and got them interested by telling them that they paid their share of the street lighting, and I could not see why their street should not be lighted as well as some others, and that the Gas Company would put in a main, and they could have gas put in the house, and convinced them that by increasing my consumers I could sell gas cheaper, which I was very anxious to do.

Gas Stoves—Our people knew nothing about. I found it quite difficult to introduce them, but I have at last got a foothold. We have now 11 cookers and 7 heaters in use, besides quite a number of small single burners. One of my gas consumers who keeps a restaurant has used his gas cooking stove all winter, in preference to a Magee range.

My winter sales are increasing fast enough, having sold, by meter, 533,500 cubic feet in January, 1889, against 447,400 cubic feet for the corresponding month of last year; a gain of 86,100 cubic feet. My summer sales are very small. I am looking to the gas stove for a very marked increase, and to attain this end have solicited orders for some to be put in when the warm weather comes. Manner of selling stoves, fixtures, etc.—a very small margin over net cost.

Gas Mains.—I test them spring and fall, and where a section shows leak, I use a bar and drive for it; when found, caulk it; test again for difference, if satisfactory, proceed to the next, and so on. *One thing* I wanted now was a regulator to reduce the pressure on the mains during a part of the night and day. I drafted one (see cut) that I thought would work, and tried it in a small way. I bye-passed the gate in the office with a 4-inch pipe, and placed the regulator in the circuit. It worked very well. Enough to warrant the making of a larger one. It is quite simple, and does not differ much from any other, except in price, and the cost was what I was trying to get rid of.

It cost the Company about $18. It is made of copper, 14 inches high, outside cylinder; 11 inches high, inside cylinder; outside ring, 15 inches diameter; inside measure, ⅛ inch thick and ¾ inch deep—this was put on a lathe and turned on the inside; inside ring, 13¾ inches diameter; outside, ⅛ inch thick, and ½ inch deep—this was put on a lathe and turned on the outside; 3 guides, 3 wheels on top, 6 on bottom; brass thimble, 4½



The Cooper Governor.

inches diameter, 4 inches high, inside; an inverted cistern valve, 2 inches diameter—this is connected by a rod with the float, and controls the pressure, steady at 1.3; night pressure, 2.2.

We burn our tar, and sell our coke for 8 cents per bushel at the works.

Discussion.

Mr. Neal—I have been waiting all the time to hear about that reduction in price to the people in that rural district. Was it made?

Mr. Cooper—Yes.

On motion of Mr. Lamson, the thanks of the Association were voted to Mr. Cooper for his paper.

At 1 o'clock P. M. the Association took a recess until 2.30 P.M.

[To be continued.]

[Second Article, concluded from page 237.]

Some Notes and Observations on American Gas Making.

By Mr. R. Dempster, Manchester, England.

There are very few tar distillers in America. The towns are so far apart that the cost of carriage to a tar-works practically kills the industry. Further, the use of water gas is so general that there is comparatively very little tar made, but what is produced can be disposed of by the companies to as great or even greater advantage than we are accustomed to here; it being sold locally for asphalting, roofing, and other purposes.

In some of the few works where the manufacture of water gas had not been taken up, I found that oil and naphtha were being utilized for the enrichment of coal gas. This is effected in the following manner: In the end arch of a bench of clay retorts, a 1-inch wrought-iron pipe, protected by special shape bricks, is led to the rear end of the retorts. The oil is run to the back portion of the retort at the rate of about 6 gallons per hour, according to the temperature. If the heat of the retort is too high or too low, it can be readily altered by running in more or less oil. In the retort lid there is generally a small plug, to allow a little of the gas to escape for testing purposes. An experienced person can tell in a moment from the color of the smoke or gas whether or not the heat is right. If it is too high, lamp ack is formed, and obstructs the ascension pipes. A separate hydraulic main is sometimes used, so that the condensed matter does not mix with the tar from the coal gas. When

the two gases ultimately meet, at the end of the hydraulic main, they amalgamate, and form a regular and permanent gas. I was told that a gallon of naphtha, costing from 2d. to 2½d., will produce 200 cubic feet of 21 candle gas; so that one retort would yield 28,800 cubic feet of gas per 24 hours. At one works they employed a crude oil, called "fuel oil," costing 1⅛d. per gallon, after the expense of its carriage for 1,000 miles had been paid on it. The engineer used half a gallon per 1,000 cubic feet of coal gas made; and this quantity, he said, raised to 18 candles a 15½-candle coal gas.

I did not find that mechanical appliances for drawing and charging retorts had made much progress in America; and the Ross machinery was the only system in use. One engineer who had it in his works, but only employed the drawers, said they saved their original cost in twelve months. In his case stokers' wages were 11s. per day; so that any labor saved by machinery would soon be appreciably felt in the finances. The charger was not a success; but I gather from a paper read by Captain Ross before the American Gas Light Association, at Toronto, in October last, that alterations have been made to the charging machine, and that it is now as successful as the drawing machine. In connection with this subject, I may say that, in my opinion, gas managers and directors of gas companies have not given engineers who have spent their time and money in designing and bringing out stoking machinery the support to which they are fairly entitled. It is admitted that the work is difficult to carry out satisfactorily, especially when we remember that parties wishing to accomplish this object ought to have the full control both of a retort house and an engineering works, in order to bring their machinery to perfection. I shall be glad to see that their efforts are better appreciated in the future, and that, if substantial aid cannot be afforded them, they may at any rate have the good wishes of their professional brethren.

I was told by a Manchester ironmaster that it was worth the journey from this country to Pittsburgh to witness the practical application of natural gas. I accordingly paid a visit to the city, which is situated in a large iron and steel manufacturing district. It is estimated that from 400 to 600 million cubic feet of natural gas are used in and about Pittsburgh every day. Prior to the introduction of this gas, Pittsburgh was styled the "Smoky City," in consequence of the heavy pall of smoke, emanating from the iron, steel, and glass furnaces, that overhung the entire place. Now there is hardly any smoke visible. I went through several works where natural gas is employed, and expected to find improved burners and methods of utilizing it with some degree of economy; but it appeared to me that the gas was used lavishly, wastefully, and anything but economically. No doubt, in time, when the flow at the wells has diminished, and the demand for the gas has increased, it will become much more costly, and users will exercise greater care in, and find better means of burning it. Houses and cottages are supplied at a charge which is about 25 per cent. more than their coal bills would come to. In towns where natural gas has to be conveyed very long distances through pipes, it is sold for cooking and heating purposes at 10d. per 1,000 cubic feet and upwards. The gas is scarcely luminous, and therefore cannot be used for lighting purposes except by passing it through and enriching it with oils in a water gas apparatus. By this means one-third of the total quantity of gas produced may be natural gas.

The high cost of gas in America has given the electric light a good opportunity of establishing itself, although in one town where gas was considered cheap at 1 dol. (say, 4s. 2d.) per 1,000 cubic feet, I found it had made greater headway than in other places where it was 6s. and 7s. An electrician told me they had 40,000 incandescent lights in use in private houses in the town. Knowing that these gentlemen have a way of "stretching" the truth, I asked the opinion of the gas manager; and he said he thought there might be half the number—say, 20,000. This will show the rate at which the electric light is progressing. It was rather a sad spectacle for a gas engineer to see thousands of gas-lamp posts with the lanterns taken out and the pipes plugged up, their places being usurped by the electric light. A considerable number of gas companies are supplying the light; and I see this practice is increasing. A very important gas company in Canada, after mature consideration, have just made arrangements to put down a large electric lighting plant. It is said that it will pay—that the city must have it sooner or later, and in that case it is better for the gas company to control it than have to fight a separate electric light company. In Detroit, the city is lighted with electric light from 120 towers, each about 130 feet high, constructed with wrought-iron tubing in the form of a triangle, and guyed in the middle and at the top with wire ropes. There are six powerful arc lights on the top of each tower. The effect is pretty; but the towers are too high, and consequently a great deal of light is lost before it reaches the ground. I cannot understand why gas engineers do not adopt a modification of this arrangement, and fix on the tops of columns or masts, about 50 feet or so high, powerful gas-burners, suitable for places like the grounds of exhibitions, where economy of light is not so much desired as a large quanity to make an attraction. Some of the regenerator lamps now in use would answer the purpose admirably.

Notwithstanding the progress of electricity for lighting purposes in America, I found that gas companies were almost without exception increasing their consumption. I also noticed that while English gas managers are greatly exercised in their minds about the competition of petroleum oil at 10d. per gallon with gas at 3s. per 1,000 cubic feet, some American gas companies were selling gas at 12s. per 1,000 feet with oil at about 5d. per gallon. Surely there is something in the cleanliness and convenience of gas which causes it to be so greatly preferred.

I found a great deal more water gas being used in America than I had anticipated; and I believe the production of this gas is far greater than many English gas engineers have any conception of. Circumstances are all in its favor in America; anthracite coal, coke, and oil being cheap, whilst the labor required for the production of coal gas is dear. It would perhaps not be out of place here to give a brief outline of the *modus operandi* of making water gas. There are dozens of different arrangements; but, essentially, the plant consists of two cupolas—a "generator" and a "superheater"—generally made cylindrical, and lined throughout with fire-bricks. The generator is filled with hard coal or foundry coke, from 3 to 5 feet, and in some systems from 5 to 10 feet in depth. The superheater varies in height from 12 to 24 feet; a perforated arch being turned a few feet from the bottom, upon the top of which, to within a few feet of the top, is packed loosely broken fire-bricks. A flue connects the top of the generator to the gas chamber underneath the arch in the superheater. The fuel in the generator is lighted, and, by means of a blast produced by a fan blower, is brought to a red heat; while at the same time the heat and products of combustion are passed through the superheater, raising the brickwork inside to an almost white heat—the products passing through an open valve and suitable communication to a chimney. When the fuel is brought to incandescence, the air-blast valves, and also the valves to chimney, are closed. Steam is then admitted below the fuel; and this, after passing through, forms water gas. Crude oil or naphtha is run, or injected in the form of spray, on to the top of the fuel, where it is vaporized, and mixes with the water gas. The mixture next goes through the superheater for the purpose of fixing the gases and making them into one permanent gas, which is then passed on to a wash box, scrubbers, condensers, purifiers, and meter to the holders. In from 10 to 15 minutes the steam going under the generator lowers the temperature of the fuel, which, of course, alters the composition of the resultant gases. The gas making is then stopped by shutting off the oil and steam. The valve to the chimney is opened, and the air-blast turned on again to bring up the fuel to the proper temperature—an operation which takes from about 6 to 8 minutes. It will be seen from the preceding description that the process is intermittent—one half the time being occupied in making gas, the other half in getting up the heat. In order that the make of gas may be something like regular or continuous, it is usual to have two sets of apparatus—one to be employed getting up the heat while the other is making gas.

There is another process called the Wilkinson system, which differs from the foregoing. Water gas is generated in a cupola, from which it is purified in the usual way and passed into a gasholder, so that the gas may be supplied regularly to a carburetor, which consists of a wrought iron rectangular vessel about 5 or 6 feet high. Inside this are tiers of shallow troughs arranged somewhat after the pattern of a Coffey still, to hold naphtha. These are heated by steam pipes which vaporize the naphtha. The gas goes in at the bottom and leaves at the top. The naphtha enters at the top, and flows from tray to tray until the residuum reaches the bottom. The gas passes in a zig-zag direction over the trays; and becomes charged with the naphtha vapors. It then flows through a bench of ordinary clay gas retorts, which are kept at a good heat; and this fixes the gas in the same way that the superheater does in the ordinary arrangements.

During my tour I had the opportunity of inspecting twelve water gas plant works, of which seven are differently arranged according to the ideas of the several makers and engineers, and all of these had advantages peculiar to themselves. All the plants that I saw used anthracite coal (of which there is an abundance in America) or foundry coke. Soft coal will not suit, for obvious reasons. Gas coke can be made to answer if care is exercised, but, owing to the sulphur it contains, a great deal of purifying is required; very large purifiers being thus necessitated. Unless care is used to prevent the formation of carbonic acid instead of carbonic oxide in the generator, a great deal of lime purification

is required to eliminate the deteriorating element. A great number of works make one-half coal and one-half water gas. At a large new works which we have just completed this has been carried out—one-half the works being set out for coal gas and the other half for water gas. Regarding the difference in cost between the production of water gas and coal gas, there is considerable variation according to the locality. One engineer who had both processes at work on a large scale gave me the following figures: A 19-candle coal gas, after deducting residuals, cost him 1s. 10d. per 1,000 cubic feet, while a 24-candle oil gas cost 1s. 2d. per 1,000 feet, both delivered into the holder; the labor on the coal gas costing 8½d. per 1,000 feet, while that on the oil gas only amounted to 2d. per 1,000 feet.

It is said that each man engaged on a water gas plant will produce 100,000 cubic feet per day; and when stokers' wages range from 8s. to 11s. per day, it tells considerably against coal gas. The water gas plant does not occupy much room, and there is very little wear and tear on it. I saw one apparatus which would have gone very comfortably into a room 18 feet square. This plant, I was told by the engineer, had made 1,000 cubic feet of 25-candle gas per minute.

Before I left New York I called at the offices of the Standard Oil Company, which owns or controls nearly the whole of the oil in America. My object in calling was to ascertain if oil or naphtha could be supplied at a price low enough to make illuminating gas here. It appears that after allowing for casks, freight, carriage, etc., nothing suitable could be supplied at less than 6d. to 7d. per gallon. I also learn that the intermediate shale oils from the Scotch works, which were selling at 3d. per gallon about two years ago, cannot now be obtained at less than 6d. per gallon; so at this rate we may conclude that water gas will not be introduced into England for some time yet, as the cost of 1,000 feet of 20-candle water gas would be about 3s. delivered into holder, thus—

Four gallons of oil at 6d.	2s.	0d.
Say 50 pounds of anthracite coal or foundry coke, including fuel for driving the engines and steam for the cupola	0	9
Purification, wear and tear, etc.	0	1
Labor	0	2
Total	3s.	0d.

The average cost in England of coal gas delivered into the holders does not exceed 1s. 4d. per 1,000 cubic feet, so that coal gas will be able to hold its own against water gas. There is also the question of the poisonous nature of water gas as compared with pure coal gas. The deaths caused by water gas I was told were in the proportion of 6 to 1 of those caused by coal gas.

In conclusion I must say that I was everywhere received by American gas engineers with the greatest kindness and courtesy, and was much impressed with their readiness to give me all the information I desired.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

By referring to the special advertisement (page 281) of Messrs. Perkins & Co., Sales Agents for the well-known Breckenridge cannel, it will be perceived that the tracks of the Louisville, St. Louis and Texas Railroad, just completed, pass directly over the Breckenridge Company's property, making a connection at Cloverport with the coal company's railroad. This fact renders the Breckenridge colliery entirely independent of the vagaries of the Ohio river, which has heretofore afforded the only highway for transporting this staple cannel to the market.

CINCINNATI, OHIO, FEB. 28.—I note in the JOURNAL, issue of Feb. 25, a slight reference to the defeat of the traffickers in gas charters experienced in Cleveland something over a fortnight ago; and also note your determination to refer to the subject at some future time. While what you would say about the case will undoubtedly cover it amply, and in point of finish, at least, excel anything that I could communicate about it, perhaps a hasty *resume* of the Council proceedings at which the scheme was *supposed* to have been laid low, would not be out of place. To begin with, then, there can be no mistake as to the interest aroused by the probability that at the Council meeting to be held on February 11th the fate of the water gas ordinance (so-called) would be determined, for on the night in question every Councilman occupied his chair—the first time in the history of the reigning body. The ordinance (originally introduced by Mr. Hull, April, 1888) having been read for a third time, the skirmish lines were thrown out, and the first shot fired in opposition was aimed by Mr. Holden, who spoke at length on the discoveries made by the committee that visited Jackson, Mich., the visit being prompted by the fact that the applicants for a franchise at Cleveland said they proposed to work under the system in vogue at that point. Mr. Holden had been led to believe by the petitioners that all the public lighting at Jackson was being performed by means of non-luminous water gas, through its action on the Fahnehjelm comb burner, whereas the fact was that only two such public lights were in use, and these were located on the premises of the gas company. The latter was far from being an establishment of any magnitude; in fact, its entire working staff comprised three men. His expose of the Company's management was at once vivid and humorous, and he pronounced the burners frail, unreliable and dangerous—being much given to "sparking." In his summary he advanced the paucity of the field at Jackson, the unreliability of the vehicle employed, and the meagerness of the illumination produced, as reasons why he objected to the petition for Cleveland being granted. Mr. Nowak followed Mr. Holden, and in a similar strain, his conclusions, therefore, being in line with those of the preceding speaker. I might add that during Mr. N.'s presentation of the subject he alluded to Jackson as a city of about 4,000 inhabitants, which suggestion prompted Mr. Faulhaber to intimate that Mr. Nowak had only seen "a part of one corner of the town." This estimate of Mr. N.'s capacity as an estimator of numbers brought from the latter the admission that "he didn't visit the penitentiary." The report of the special committee that visited Jackson was then read—this committee was composed of Messrs. Faulhaber, Sheehan, Shanklin and McQuoid; and although they are all pretty good fellows, I am obliged to add that one of them at least would have some trouble to designate off-hand the difference between a gas retort and a water gas generator—and what they failed to mention would seem to have a much more important bearing on the subject than that noted by them. For instance, they reported that "no ingredient, such as naphthaline, is used to give illuminating qualities, that effect being attained by the use of combs in which are suspended magnesia points, the combs being so adjusted," etc. Again, the committee say, "It is claimed that 4,000 feet of water gas is equal to one ton of coal;" and, further on, "at the works and places where the gas is consumed its odor was very distinct." Figuring it all out from an impartial point of view, the committee seemed to favor the Jackson experiment, provided its promoters told the truth. In other words, it was likely to be important, if true. And I would submit that it requires a very fair article of gas 4,000 cubic feet of which is to equal the fuel result obtained from the combustion of a ton of coal. Yet I suppose even 1,000 cubic feet of any gas would be equal in heating effect to a ton of anthracite dust. When the report had been read Mr. Hull, the father of the ordinance, made a speech in favor of the measure, the burden of which was that Cleveland ought to have competition in gas, and that his friends were those who should secure the right to bring out the competition. His ending sentences were of a nature to remind one of the moss-clad cypresses that haunt, even while they thrive, in the bayous of Mississippi and Louisiana. Venerable, but not awe-inspiring. Chestnutty but not green. Bearded but not pointed. In fact, his remark that "the old Cleveland Company's gas rates were in reality as high as they were when but $1.40 per thousand was charged," actually brought a smile to Mr. Faulhaber's face, and so the pleading terminated. In what may be termed the closing proceedings Mr. Logue administered a telling blow to Mr. Hull and his confreres by remarking that no information had ever been vouchsafed the Council as to those who were the monetary backers of the scheme; and while it was all very well for the charitable not to let their right hands know what their left hands are engaged in, those upon whom the charity is to be bestowed are not required to be so particular. Hence he thought as Cleveland was to be benefited, Cleveland ought to be excused for wishing to know a trifle about the benefactors, particularly as Cleveland was implored to give away a pretty good ordinance. Mr. Logue then moved an indefinite postponement of the ordinance, which was carried, by a vote of 24 to 16; whereupon Dr. Poole, who put in some pretty effective work (albeit of the silent sort) against the schemers, then moved to reconsider, which motion, of course, was defeated. This disposes of the case for the present Council; but it is an open secret that the fight will be renewed at another opportunity, which shall come perhaps with the succeeding body of Cleveland's City Fathers. The present gas suppliers in Cleveland, however, do not seem to be greatly afraid of the probable outcome, because they are now preparing to construct a gas plant that shall eventually be a model one in all respects, and in every sense worthy of the solidity of the city to whose lighting wants it shall cater. I might also remark that the Company does not seem over-anxious to join in the cry for the combined supply of gas and electric light, although it has been hinted to me that the project at one time was being seriously considered by its Directors. Those who move lowly travel safely, and those who travel safely journey far—this is

not put forth as a literal rendering of the proverb, but its moving sentiment will be found therein. In any event, I presume that Presidents Morley and Warmington, together with Engineer Hyde, may be trusted to continue to do in the future what they have so ably done in the past—manage their own affairs in a sound, conservative, successful way.—T. A. J.

THE City Council of Lincoln, Nebraska, having repealed the ordinance creating the office of Gas Inspector, Mr. Jos. McGraw, who held the office for three months, once more becomes a private citizen; and the horse, well the poor animal will not hunt street lamps any more. As was to be expected, the Council soon discovered that the office was more ornamental and expensive than useful, for during the incumbency by Mr. McGraw of the privileges, emoluments, etc., of the position, not a meter was tested at the request of a consumer who thought his gas measurer was too fast or his gas bill too large. We have ridiculed this action of the Council because the Lincoln Gas Company has, in accordance with the demands of the residents, and its own desire to keep in that part of the road where the going is clear, reduced its gas rates as fast as the increase in consumption warranted. The proof of this is that gas is now sold there at $2 per thousand cubic feet.

AN interesting hint from Manager Ellis, of the Galion (Ohio) Gas Company, is to the effect that all gas consumed in that place since the first ult., is to be billed at the net rate of $1.50 per thousand cubic feet, which means that an all-round cut of 25 per cent. has been made. It takes a good share of courage in these days (even though, as "Observer" remarked in the JOURNAL some weeks ago, the world moves) to take such a radical step as that instanced at Galion, but we imagine the step shall be found to lead to greater security, if even not right away to greater profit. Mr. Ellis has our congratulations and good wishes.

MESSRS. SAMUEL WARDEN AND J. G. SHOPE have leased the Mt. Pleasant (Pa.) gas works for one year, with the privilege of continuing the agreement for three years. The rental is fixed at $400 per annum, the lessees to purchase all new meters and to make all necessary plant repairs. They ought to do well at Mt. Pleasant on this basis, although there is a good share of hard work before them.

ONCE more is the enterprise of the Richardson & Robbins management of the Dover (Del.) Gas Light Company shown in a current announcement that gas rates have been lowered to $2.00, gross, and $1.80, net, per thousand cubic feet. The only condition necessary to secure the net rate is settlement of accounts during the first half of the month following the presentation of bills. As Dover certainly does not contain over 4,500 inhabitants, every gas man will appreciate the cheapness of the new schedule; and it might be of interest were we to note a fact or two in the history of this plant. The works and franchise were purchased by Messrs. Richardson & Robbins at sheriff's sale, something like a score of years ago, prior to which time they had been engaged in sending out a gas compounded out of wood vapors and oil, which was disposed of at the rate of $8 per thousand. The purchasers fitted up a compact type of coal gas plant, the initial gas schedule being $5 per thousand. From that time on (quite as rapidly as the conditions permitted, in fact) reduction followed reduction, until the present figure was reached, and which is not the end yet by any means. In the meantime the owners have managed to continuously pay an 8 per cent. dividend, and repairs and improvements have also been paid out of revenue. In forwarding us information about the reduction, Mr. A. B. Richardson writes, "every time we reduce the price we increase our consumption, and please our customers." Evidently these gentlemen know as well how to tickle the fancies of gas consumers as to tickle the palates of lovers of plum puddings, the method of preparing which has made the firm name of "Richardson & Robbins" a household word throughout the United States.

IT has come to our notice recently that in January last the Boston Druggists' Association absorbed their annual dinner at the Tremont House, which, as gas men know, is a right likely spot to dine in. Of course, after the dinner came a flood (more or less frothy) of eloquence, to which several speakers contributed their rivulet. One of these (the Hon. A. W. Beard) responded for the State of Massachusetts, and whether it was the wine or the warmth that affected him we know not, but certain it is that he managed during his allotted period to direct the attention of the druggists, among other things, to the dire necessity that existed for the placing of the manufacture and sale of artificial illuminating gas in the control of municipal authority. The connection between druggists and illuminating gas being rather remote, we think it would have been far more pertinent did the speaker confine himself to reviewing the dangers connected with the turning of drug shops into general liquor stores, and suggesting a remedy for, or a modification at least of the evil.

HIGHTSTOWN, N. J., is said to have arranged for an arc system of public lighting.

THE Mt. Carmel (Pa.) Gas Light Company has been incorporated, with a capital of $10,000. This place is a post village of a similarly named township in Northumberland county, Pa., and is about 16 miles southeast of Danville. It is on spurs of the Lehigh Valley and Mahanoy & Shamokin Railroads, and is the center of an important anthracite deposit. Population, about 3,800.

THE contract for the delivery to the Bay State Gas Company of the pooled stock of the Boston Gas Company was signed on Washington's birthday anniversary. The shares are to be delivered, for cash, on the 29th inst.

CITIZENS of Detroit, Mich., have been speculating on the identity and solvency of certain New Yorkers who subscribed as sureties on the bond recently filed by the Michigan Gas (natural) Company, which concern it is said desires to furnish natural gas to Detroit and other places in the Wolverine State. The bond in question replaces the one originally submitted to the committee of Council having the ordinance in charge, and is in the nature of a warantee (forfeit of $100,000) that the spirt of the ordinance will be fulfilled—provided it is ever passed, that is. The signers are Isaac B. Newcomb, Chas. M. Fry, Harry B. Hollins, John Byrne, and Frank Sullivan Smith. There need be no doubt as to the solvency of that quintette; for Hollins's guarantee in that amount would be considered ample in this vicinity.

GREEN ISLAND (an island in the Hudson river opposite Troy, N. Y.) resolved to discard oil lamps for electricity on its streets, and was very enthusiastic—before the working estimates were made. In fact, the Trustees had all but agreed to give the task to a prominent electric supplies company. The figures, however, caused them to call a halt; and fearing they might again change their minds, a contract was at once awarded to the New York and New Jersey Globe Gas Light Company for the maintenance of 80 or more naphtha lamps (dark to daylight schedule), at an annual charge of $20.80 per lamp. Quite a difference between this total and that proposed by the Thomson-Houston Company, who would light the place "properly" for about $5,000 a year. The T.-H. folks may bring suit against the Trustees.

WE understand that gas is soon to be sent out from the new plant of the Stoughton (Mass.) Gas and Electric Light Company. The electric division is now in action.

As was intimated in these columns some time ago, the present Common Council of Philadelphia proposes to move in the matter of instituting a reduced gas rate. Councilman Henderson took the initiative step by presenting the following preamble and resolution at the session of Council held on Feb. 21:

Whereas, By the introduction of water gas the cost of the illuminant to the city has been greatly reduced, and

Whereas, The rate charged consumers is higher than is collected in many of the principal cities of the country; therefore be it

Resolved, That Councils Committee on Gas be requested to consider the advisability of reducing the price of gas to private consumers from $1.50 per thousand cu. ft. to $1.25 per 1,000 cu. ft. on and after July 1, 1889, and to report at the next regular meeting of this Chamber.

Although the resolution was referred without debate to the Gas Committee, Mr. Henderson, in presenting it, took advantage of his opportunity to speak in support of the measure. His most telling argument was in respect to the double taxation virtually imposed upon gas consumers by the ruling high gas rates, and his attack on the fairness of the proposition advanced by Director Wagner—who on a recent occasion publicly declared that he expected the city would make a net profit of at least one-half million dollars through the gas supply this year—who declared that the surplus from operation of the gas works would effect or pay for great public improvements, such as street repairing, sewer extension, etc., was well timed. In these respects the Councilman said, "I see that Director Wagner says he expects that the city will make a clear profit of one-half a million dollars this year, and that next year he estimates there will be a full million available from the Gas Bureau to be spent in general public improvements. Now, I fail to see the equity of

levying a special tax, for it is undoubtedly such, on every consumer of gas, in addition to the regular rate of $1.85 per thousand on his property for municipal expenses and permanent city improvements. The city of Philadelphia should no more go into the gas business with the purpose of making large profits to be used for exactly what the county tax is levied than it should go into any other enterprise for like purposes." There is little doubt but that a revision in the Philadelphia gas rate will speedily be ordered, but we incline to the view that a compromise net rate of, say, $1.30 per 1,000 will be agreed on.

Mr. John W. Bates, formerly in charge at Utica, N. Y., has been retained by the New York Contract Company to construct the new coal gas plant which the latter has agreed to put in operation at Decatur, Ala. It is hoped to have everything in readiness there for gas making on or before July 15th.

The Committee on Gas, Sedalia (Mo.) City Council, in reporting back to the Council proper, on the proposed lighting of the city for a term of five years by means of arc lamps, recommended that all the bids submitted, save that handed in by the Sedalia Electric Light Company, be rejected. The proprietors of the latter (Messrs. Deutsch & Co.) offered to furnish 100 half-power arcs (moon-table) at the rate of $87 each per annum. The Council adjourned without taking definite action, although insiders say that the Council will eventually indorse the report of the Committee. This will at last give some value to the franchise held by Deutsch & Company.

If money counts for anything, the Newport (R. I.) Edison Electric Light Company ought to be a grand success; for we note that a meeting of the stockholders, to accept the charter granted by the General Assembly, the following officers were chosen: Directors, Cornelius Vanderbilt, Louis L. Lorillard, A. C. Titus, Ogden Goelet, T. M. Seabury, R. L. Weiling, R. C. Derby, and F. S. Hastings; President, Louis L. Lorillard; Secretary and Treasurer, John Whipple. There's richness!

At a recent meeting of the Council of Bristol, R. I., Mr. J. Howard Manchester, Agent Bristol Gas Light Company, petitioned for the right to erect poles and string wires for the distribution of electric light currents. The proposition was laid over for a few days. In the meantime the authorities are in a dilemma, having at an earlier period vested an exclusive right to this privilege in the Bristol Electric Light Company. Mr. Manchester, however, argues that according to the spirit of the town laws no exclusive privilege of this nature can hold good in Bristol; hence the former grant to the Bristol Electric Light Company, in so far as the same is to be considered exclusive, is void. Mr. Henry W. Hayes, advisory counsel to the authorities, is said to uphold the Manchester theory.

We understand that the proprietors of the new gas company at South Omaha, Neb., mean business. They propose to expend $25,000 in plant construction, and assert that they will be ready to supply gas before the close of the summer. Perhaps.

The Belleville, Ills., Council has authorized the Incandescent Light Company (St. Louis, Mo.) to establish and operate a plant in that city. Its proprietors must have strong faith.

At the special election, ordered by the Trustees of Oneonta, N. Y., to determine whether or not the taxpayers would indorse the contract which sought to bind the village to take public electric lights for a term of five years, the proposition was rejected. Only 51 votes in favor were cast, while 432 negative answers were returned.

At the annual meeting of the Leominster (Mass.) Gas Light Company the following results were recorded: Directors, Chas. L. Joslin, N. Harwood, C. Derby, Geo. F. Morse, and Geo. Hall; President, Chas. L. Joslin; Clerk and Treasurer, H. M. Lane. The latter was also authorized to act as Manager of the Company, from and after the 1st prox., at which time his lease of the plant expires. Mr. Merrick Howe declined a re-election as Treasurer.

Coming to Their Senses at Chelsea, Mass.—In common with others, we were more than surprised on receipt of the information that the Aldermen of Chelsea, Mass., had, without a hearing, granted to J. H. Cunningham and others the right to operate an opposition gas plant in that city. We thought that this was a case where the strikers had bitten off more than they could comfortably chew, even admitting that the capacity of their jaws shows markedly over the normal; and some, in fact about all, of the grantors and grantees speedily felt the strain on their facial muscles. The meeting of the Council succeeding that at which the grant was passed offered an opportunity for relief. On "this occasion" Alderman Elwell "rose to a question of privilege," and admitted that "one week ago to-night" he contributed to an illegal act, and then moved that the resolution empowering Cunningham *et al* to build a gas works be rescinded. Alderman Flanders having seconded the motion, Alderman Martin—who imagines that a thread from the mantle of the late Chas. Sumner runs through his toga, thus insuring him the gift of precision in speech and justice in decision—abused the cloak of privilege by, first admitting his ignorance of the commonest of the city's laws which, as a sworn servant, he was there to uphold, and subsequently by making a savage (but quite natural, though) attack on the existing Gas Company, which for almost two score of years has served Chelsea faithfully and well. Some of his reasons are unique. For instance, he says because of the poor judgment displayed by the originators of the Gas Company in selecting a site, the Company for years past has been obliged to expend $4,000 to $5,000 per annum in carting coal to its retort houses, and then calmly passes on to say that the new Company would, by its expenditure on plant construction, distribute money to the city's workingmen. Are we, then, to suppose that the leading divines, lawyers and bankers of Chelsea were those who have received the money annually spent by the old Chelsea Company in transporting that coal, the moving of which seems to trouble Ald. Martin so much? for perish the thought that Ald. Martin was ever seen perched on the front of a tilting cart. Or is it not as honorable to labor in moving coal as it is, for instance, to dig in the pit of a gasholder? However, our brilliant Alderman "thought that if it (the old Company) had a competitor in the city, the citizens would be benefitted, and that both companies *might* make a living." Never mind that likelihood, Ald., they *would* eventually make a living. And as for the benefit; your big neighbor, Boston, will soon find out that opposition gas charters "come high." And it goes without saying that with the new owners having to invest $6,000,000 in the purchase of an original capital of $2,500,000, the day of dollar gas in the Hub proper is further off than it was five years ago; for there can be no doubt of the fact that, had the old Boston Company been allowed to pursue the even tenor of its way, 1890 would have been hailed as the year of dollar mark in Boston. Ald. Martin having concluded his harangue, the Mayor (Mr. Champlin) read a communication from the Cunningham coterie withdrawing their petition, and intimating their intention to file a substitute therefor at an early date.

From a local source we glean the following respecting the history of the Burlington (Vt.) Gas Light Company: On the 22d of February, 1854, the Company (which had actively entered into business only two months before) was obliged to suspend operations because of inability to keep its holder tanks free from ice. The rate charged for gas was $5.70 per thousand. During its 35 years of existence 25 annual dividends were paid, the maximum being at the rate of 8 per cent., the minimum at 2 per cent., per annum. The average annual rate is a trifle under 5 per cent.

The new proprietors of the Middleboro (Mass.) Gas and Electric Power Company have notified the consumers of a reduction in gas rates. We understand that the process of manufacture at this point (in 1888 an oil gas, averaging 25.10-candle power, with an admixture of 40 per cent. of air was distributed) is to be changed.

We believe that the City Council of Hamilton, Ohio, is advertising for plans and estimates for the construction of a coal gas plant to be operated in connection with the municipal system of that city.

The Kirksville (Mo.) Light, Heat and Power Company has been incorporated.

On the 23d ult. a meeting of the Directors of the Concord (N. H.) Gas Light Company was convened for the purpose of receiving a report from a special committee appointed to consider the advisability of the purchase by the gas company of the plant of the Concord Electric Light Company. The report favored the purchase, and that view was also taken by the Board, who ratified the sub-committee's arrangement. The electric plant, originally installed by Messrs. Stevens & Hammond in 1886, has a capacity of 126 arc lights, and is in good working order. The new proprietors, who are to have full ownership after April 1st, have determined to add an incandescent plant to the property. The gas

department of the Company will, of course, remain under the supervision of Mr. Wm. Badger, while Mr. Nathan P. Stevens is to have charge of the electric annex. Mr. Edgar H. Woodman was elected Treasurer and Agent of the Company, vice John M. Hill, resigned.

We understand that W. A. Boland has purchased a controlling interest in the property of the Citizens Steam and Gas Company, Lynn, Mass., and proposes to vigorously push the experiment of supplying artificial fuel gas. This plant has not proved in any sense a bonanza for those that have been interested in it.

At the annual meeting of the St. Paul (Minn.) Gas Company no change was made in the executive management.

T. W. Wilmarth & Co., Chicago, agents for the Edison United Manufacturing Company, were awarded the contract for furnishing the gas fixtures to the new State Building, Atlanta, Ga. A combination gas and electric fixture was chosen, and the price to be paid is $10,000.

Articles incorporating the Orting Light and Water Company, to operate in a similarly-named town in Washington Territory, have been filed at Tacoma. The Trustees are F. E. Eldrege and E. A. Boatman, and the capital stock is fixed at $240,000.

The Victoria (B. C.) Water, Gas and Electric Light Company proposes to establish and operate a water and light supply for Whatcom, Wash. Ter.

Less than a week ago the "Boston News Bureau," which issues a daily sheet purporting to give in condensed form the news of the 24 hours that is likely to be of interest to investors, gravely published the following: "Manager of Edison Electric Light Company, of Chicago, says: 'Since September we have established in the city of Chicago 13,000 electric lights. Since Dec. 1st the city has established over 200 arc lights. Altogether, electricity has superseded gas jets in Chicago." Well! well!

The proposition to purchase and operate a municipal lighting plant of the arc type at Revere, Mass., has been postponed indefinitely. Good thing for the taxpayers, that.

Having strung their arcs over every available and unlikely spot in the city, the promoters of the arc lighting system in Brooklyn, N. Y., are keeping their eyes open for other likely districts. We therefore presume that they are preparing for a sortie on Flatbush, this idea being suggested because of a bill recently introduced in the State Assembly, by Mr. Graham, which authorizes the town authorities to make contracts for public lighting by other means than gas.

The Marshall (Texas) gas plant—owned or controlled by the New York Contract Company—is being overhauled; and the truth is that such labor is not misdirected.

Dangers Beneath the Pavements.

The *Electrical Review*, in an article entitled "The Dangers of Gas," says:

Much has been written regarding the attempt to put electric wires in gas mains, but far more yet remains to be said about how to keep gas out of electric conduits. Deaths among electric workmen from asphyxia and from injuries due to explosions caused by the presence of illuminating gas in underground conduits are being recorded with an increasing and unpleasant frequency.

What to do to keep the gas out, and if it is present how to render the operation of laying underground conductors a safe one, are problems which confront the electrical engineer. Obviously, if all the conditions were under control of the electrical company, the remedy should be applied to the first cause, leaky gas mains; but as such a treatment of the subject is impracticable, and as accidental leaks may occur at any time even in properly constructed mains, the electrical subways should be made as far as possible gas tight. No matter how much care may have been exercised in the construction of subways, they may at any time be found to contain gas in dangerous quantities, and precautions should always be adopted to guard against accident by those entering the manholes.

A good plan, much used by cable splicers when compelled to work in a manhole which is found to contain gas, is to allow fifteen or twenty minutes for ventilation, after taking off the cover, before entering; then to proceed to close up with pipe clay all the openings into the ducts. Pipe clay is used in preference to cement because it does not harden and can easily be removed. In those ducts into which cables have been drawn there is between the cables and the walls of the ducts more or less space which should be carefully filled with this clay.

During all the time that the splicer remains in the vault his helper on the surface sends down a supply of air from a rotary blower which is operated by a crank. This keeps the manhole ventilated and renders the work of splicing comparatively safe. Without the sealing up of the ducts all attempts at ventilation may prove useless, because if communication with neighboring manholes is allowed, a sudden draught of air might suck into the working chamber a volume of gas sufficient to smother the workman while his helper was contentedly turning the crank of the air pump on the surface above.

It is well to bear in mind that the treatment for asphyxia is similar in many respects to that used in resuscitation from drowning. If a workman should be overcome by gas his life may depend on the way he is handled before the arrival of a physician. He should be brought into the fresh air at once. Efforts should be directed toward keeping up the heart's action and restoring the circulation, and for this purpose stimulants may be given. The foul gases should be expelled from his lungs and artificial respiration practiced if necessary.

Unless a general system of subway ventilation is carried out this plan of sealing up the ducts should be extended to all the manholes whether there are men at work in them or not, otherwise a leak at one point might flood the entire system with gas. Under the latter condition an explosion at one place may be transmitted through the connecting ducts to a number of manholes, causing great destruction.

To detect the presence of gas is not an easy matter, especially in view of the fact that certain kinds of illuminating gas are inodorous. It has often been suggested that some chemically prepared paper, to be used after the manner of litmus paper, which is turned red by acids and blue by alkalies, might be devised for this purpose, but it hardly seems possible that anything of this kind will be produced, as it is necessary to know not only that gas is present, but also in what quantities. It is too much to expect that there ever could be devised an apparatus for the quantitative and qualitative analysis of gases simple enough to be operated by a subway laborer.

All ordinary underground cable laying operations can be conducted without the use of a torch in the manholes, but there are cases where its use becomes necessary, and in those instances unusual precaution should be taken to make certain that an explosive mixture of gas is not present.

The introduction of underground wires has brought with it new troubles, and it would seem for the interest of all that something should be done by the various companies towards securing uniformity of practice in dealing with this dangerous element, which threatens not only the lives of the cables, but also the lives of our workmen.

Recent Patent Issues.

The following list of recent patents relating to the gas interests is specially reported by Franklin H. Hough, solicitor of American and foreign patents, 925 F street, N. W., Washington, D. C.

Issue of Feb. 19, 1889.

398,306. Apparatus for the Manufacture of Gas. J. D. Averell, Brooklyn, N. Y.
397,904. Gas Burner for Billiard Tables. W. F. Folmer, N. Y. city.
397,907. Gas Generating Furnace. J. Gilbert, Omaha, Neb.
398,051. Gas Generator. J. Jordan, Bridgeport, Pa.
398,108. Gas Motor. C. T. A. H. Wielding, N. Y. city.
398,021. Gas Regulator. J. Bardsley, Oldham, county of Lancaster, England.

Issue of Feb. 26, 1889.

398,404. Regenerative Gas Burner. F. G. Johnson, N. Y. city.
398,384. Coal Gas Condenser. F. J. Davis, Waltham, Mass.
398,805. Gas Extinguisher. A. Steinhilber, N. Y. city.
398,482. Gas Furnace for Steam Boilers. G. Whysall and J. A. Lambing, Toledo, Ohio, and Wilkinsburg, Pa.
398,707. Gas Meter. J. W. Culmer, New Brighton, Pa.
398,721. Gas Meter. J. J. Harrell, New Brighton, Pa.
398,708. Plural-piston Gas Meter. J. W. Culmer, New Brighton, Pa.

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Germany.—B. WESTERMANN &CO., of New York.

MONDAY, MARCH 4, 1889.

The Market for Gas Securities.

Consolidated kept the advance of a week ago, although the trading was in very small volume. Considerable investment inquiry was made, and several small lots in consequence have been permanently taken out of the Wall street maelstrom, and this fact recalls to mind another important one which is that the "floating" percentage of these shares is being rapidly diminished; and it is quite remarkable that a Company doing business solely in New York city, and with such a large number of shares in its capital, should have what might be termed so small a number of certificates in the floating stage. However, it is quite easy to borrow them. The general impression—in which we share—is that the first dividend on Consolidated for 1889 will be at the rate of 2½ per cent. Should this increase actually come to pass, Consolidated would be cheap at 95. Equitable is a shade off, purchasers not being inclined to increase their bid of 112, while holders still insist on at least 3 points higher. Mutual is steady and strong at last week's notch.

Brooklyn shares are not much inquired after, and the dickerers in Citizens gas are keeping close counsel. There can be little doubt that, with the holder insurance paid, this Company would be in better position than it was before the memorable gale of last January. By the way, President Howard alone deserves credit for causing the insurance of the wrecked vessels, and this ought to quiet somewhat the apprehensions of those shareholders who a year or so ago insisted that the executive management absorbed too much money in the shape of salaries. An amusing phase of the Boston situation is the discussion by some of those who did not, and by others who did pool their stock as to the disposition of the large bonus to be paid the pool trustees by the Bay State folks. All of the shareholders want a slice of it, but this will cut the loaf into very small parts. Yet, as the laborer is worthy of his hire, we think the persons who managed the pool ought to be paid for their shrewdness; and it is more than likely that the managers will obtain their reward—they deserve it, too. We understand that an exclusive 15-year charter for the operation of a fuel gas works in Lexington, Ky., has been obtained by New York parties, who will build forthwith.

Gas Stocks.

Quotations by Geo. W. Close, Broker and Dealer in Gas Stocks.

16 WALL ST., NEW YORK CITY.

MARCH 4.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par value of $100 per share.

	Capital.	Par.	Bid	Asked
Consolidated	$35,430,000	100	83⅜	—
Central	466,000	50	—	—
" Scrip	220,000	—	47	57
Equitable	2,000,000	100	112	117
" Bonds	1,000,000	—	113	115
Harlem, Bonds	170,000	—	—	—
Metropolitan, Bonds	658,000	—	115	118
Mutual	3,500,000	100	98	100
" Bonds	1,500,000	—	100	102
Municipal, Bonds	750,000		—	—
Northern	125,000	50	30	—
" Scrip	108,000			
Yonkers		50	90	100
Richmond Co., S. I.	300,000	50	55	60
" Bonds	12,000	—	—	—
Gas Co's of Brooklyn.				
Brooklyn	2,000,000	25	103	105
Citizens	1,200,000	20	45	55
" S. F. Bonds	320,000	1000	—	103
Fulton Municipal	3,000,000	100	125	130
" Bonds	300,000		—	106
Peoples	1,000,000	10	72	74
" Bonds (5's)	368,000	—	97	—
" " (6's)	94,000	—	100	—
Metropolitan	1,000,000	100	85	88
Nassau	1,000,000	25	110	112
" Ctfs	700,000	1000	100	103
Williamsburgh	1,000,000	50	120	122
" Bonds	1,000,000	—	111	112
Out of Town Gas Companies.				
Boston (Mass.) Gas Co	2,500,000	500	240	—
Buffalo Mutual, N. Y.	750,000	100	90	95
" Bonds	200,000	1000	95	100
Citizens, Newark	1,000,000	50	—	—
" " Bonds	45,000	—	—	—
Chicago Gas Trust	25,000,000	100	43	—
Cincinnati G. & C. Co.	6,000,000	100	190	193
Consumers Toronto	1,000,000	50	192	—
Central, S. F., Cal.			—	90
Capital, Sacramento, Cal.			58	—
Consolidated, Balt.	11,000,000	100	44¼	44⅞
" Bonds	6,400,000		107	107½
Hartford, Conn	750,000	25	120	130
Jersey City	750,000	20	165	170
Laclede, St. Louis, Mo.	2,000,000	100	—	115
Louisville, Ky.	2,570,000	50	125	130
Little Falls, N. Y.	50,000	100	—	100
" Bonds	25,000	—	100	103
Montreal, Canada	2,000,000	100	211	214
Memphis (Tenn.) Gas	750,000	100	48	51
" Bonds.	240,000	100	103	—
New Haven, Conn		25	193	197
Oakland, Cal.			34¾	35
Peoples, Jersey City		—	60	61
" " Bonds			—	—
Paterson, N. J.		25	90	—
Rochester, N. Y.		50	75	80
Syracuse, N. Y.	500,000	25	—	—
St. Louis, Missouri	600,000	50	—	—
San Francisco Gas Co. San Francisco, Cal.	10,000,000	100	62½	62¾

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Have had large experience in the manufacture and distribution of gas (coal and water), and in the construction of plants. A1 references. Address "INQUIRER," care this Journal.

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By a thoroughly competent and trustworthy man. Has had years of experience in the manufacture and distribution of gas, also in the construction of works. Unquestionable references. Must be a works sending out ten millions or more. Address

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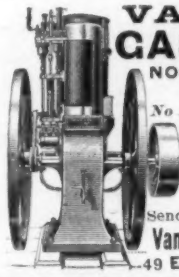

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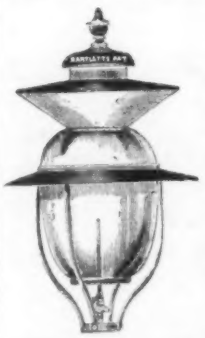

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A Result that is not obtainable from any other Cannel, Foreign or Domestic.

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While it contains all the valuable enriching properties of Naphtha, or Oil in any shape, it needs no careful supervision to prevent accident from fire or explosion.

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Every consumer of Oil is aware of the great loss from leakage and evaporation which occurs while that article is in transit to the gas works—in many cases increasing the original cost of the oil over 30 per cent.

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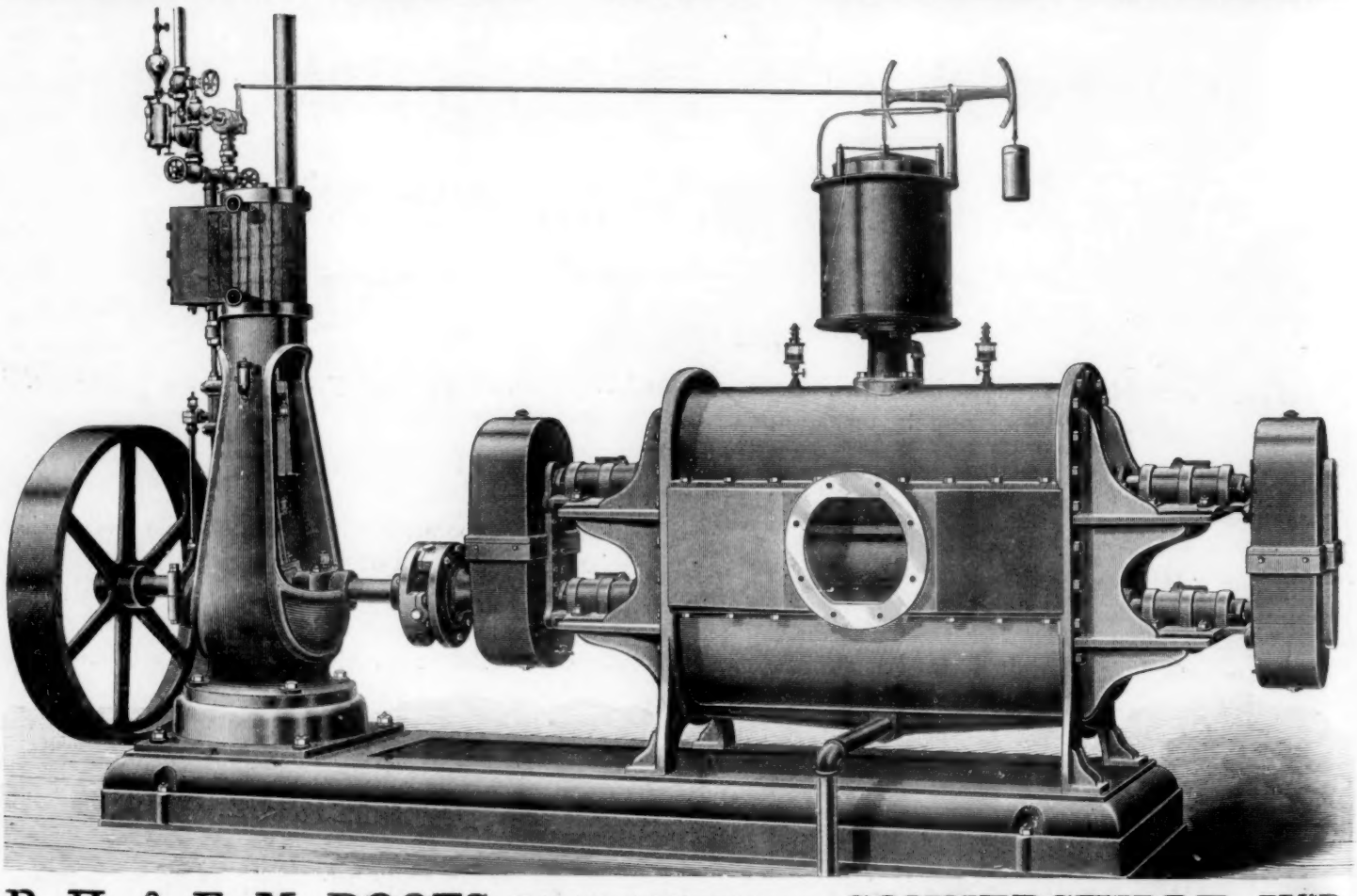

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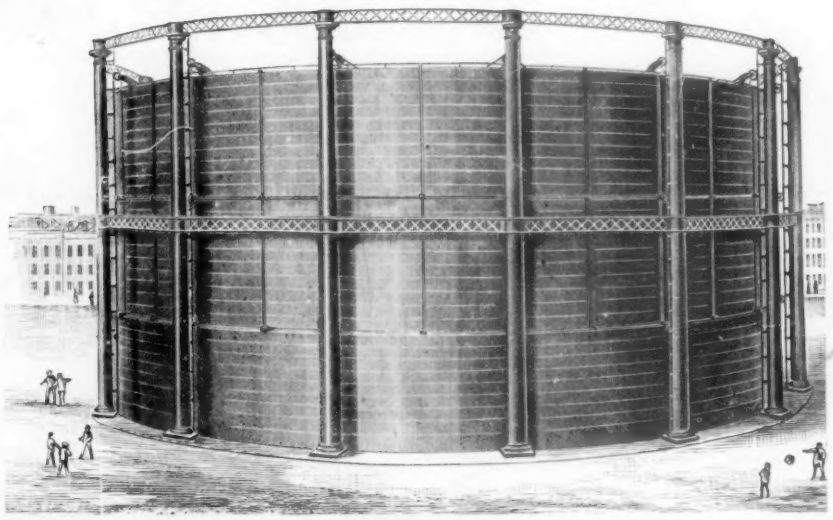

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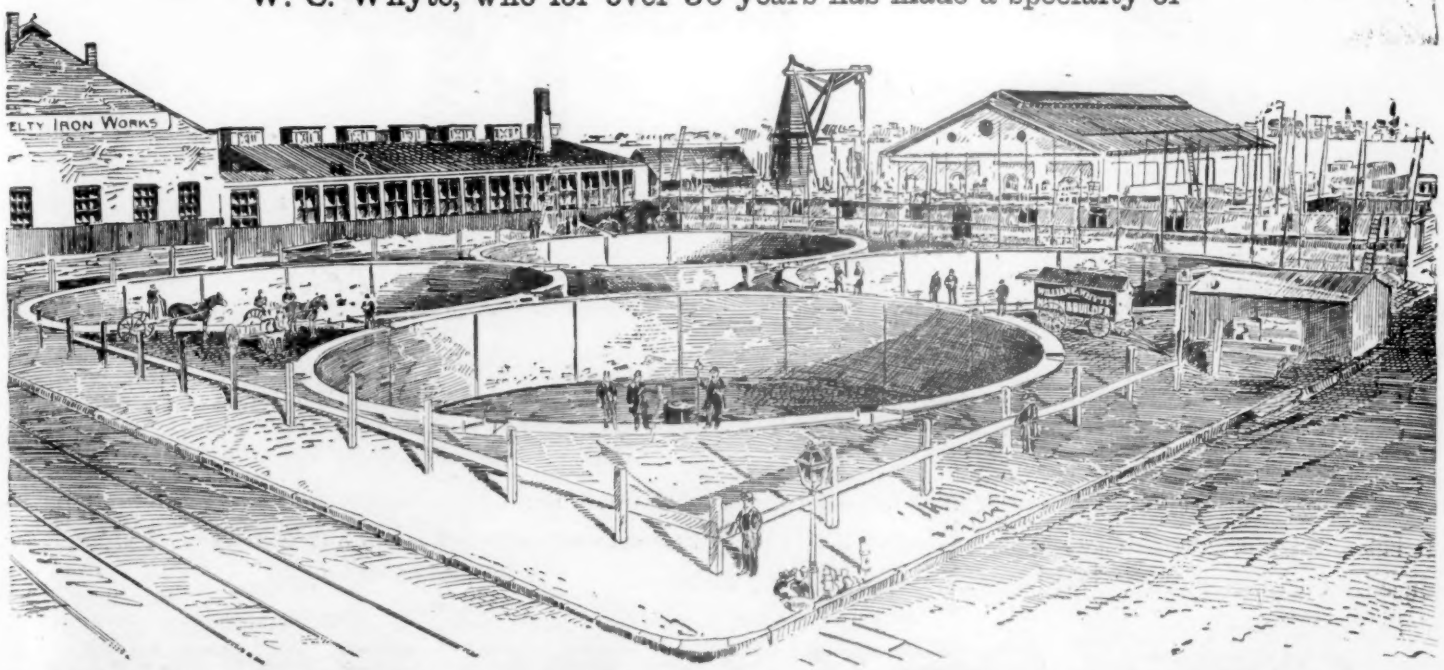

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WALKER TAR AND CARBONIC ACID EXTRACTOR.

A very general demand exists, in both large and small Gas Works, for an apparatus that will be absolutely efficient in the removal of the tar which passes the hydraulic main and condenser. Many attempts have been made to accomplish this, but, I believe, without success, until the introduction, five years ago, in England, of the C. & W. Walker Patent Tar and Carbonic Acid Extractor. During these years this apparatus has been adopted by many of the most prominent Engineers, not only in England, but also on the Continent of Europe and in other parts of the world. It is only necessary to give here a partial list in order to convince any intelligent American Gas Engineer that this machine must have succeeded fully in accomplishing the desired results.

The following Engineers have personally given permission to refer to them:

G. C. Trewby, Esq., Engineer-in-Chief of the Gas Light and Coke Co., London. The manufacturing plant at Beckton is built in complete sections of 3,000,000 cubic feet capacity each. A Walker Tar Extractor has been fitted to each one of these sections. This was done after a long and thorough trial on one of its sections. The Tar Extractor has been supplied to other works of the Gas Light and Coke Co., including those of which John Methven, Engineer of the Gas Light and Coke Co. at the Nine Elms Station, is in charge. Also to G. E. Stevenson, Peterborough Gas Works; B. Green, Mitcham and Wimbledon Gas Works; W. H. Smith, Bedford Gas Works; F. Linging, Norwich Gas Works; J. T. Browning, Colchester Gas Works; S. B. Darwin, Portsmouth Gas Works; J. McCrae, Dundee Gas Works; W. J. Wells, Stamford Gas Works; J. M. Darwin, Longton Gas Works; J. Paterson, Warrington Gas Works; and J. Coulter, of the Dundalk Gas Works. All of the foregoing gas works are located in Great Britain.

Mr. Charles A. Gerdenier, Superintendent of the Bridgeport (Conn.) Gas Light Company, writes as follows, under date of Dec. 3, 1887:

"The C. & W. Walker Tar and Carbonic Acid Extractor has been in operation at these works for the past six weeks, and is an unqualified success. It removes every particle of Tar from the gas in once passing through the apparatus, and a large percentage of the Carbonic Acid. I also feel quite sure that it prevents the formation and deposit of Naphthaline, because since I started the Washer I have had no stoppages from this cause. These works have been seriously troubled with Tar for many years, and I have used several kinds of apparatus and every expedient which has come to my attention for dealing with the difficulty, but without success. The Walker apparatus occupies comparatively small space, is less expensive than other systems, and requires but little attention. I carry 2½-inch seal, and have an automatic tar delivery valve. This Tar Extractor is indispensable to gas makers."

I have taken the Agency for the United States for this apparatus, and am now prepared to make contracts to erect it on the premises of any Gas Company. It would be manufactured in the following sizes:

No. 1,	50,000	to	100,000	cu.	ft.	per	24	hrs.,	3	ft.	square, 5 ft. deep.
No. 2,	"	"	125,000	"	"	"	4	"	"	"	"
No. 3,	"	"	250,000	"	"	"	5	"	"	"	"
No. 4,	"	"	500,000	"	"	"	6	"	"	"	"
No. 5,	"	"	750,000	"	"	"	7	"	"	"	"
No. 6,	"	"	1,000,000	"	"	"	8	"	"	"	"
No. 7,	"	"	1,250,000	"	"	"	9	"	"	"	"
No. 8,	"	"	1,500,000	"	"	"	10	"	"	"	"
No. 9,	"	"	2,000,000	"	"	"	12	"	"	"	"
No. 10,	"	"	3,000,000	"	"	"	15	"	"	"	"

This Tar Extractor will perform its work with about one-fourth the usual back-pressure heretofore required. It is simple in construction, and can be supplied at a very reasonable price—less than any other ever before introduced. Satisfactory results will be guaranteed in every instance.

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Elkhart Gas Light and Coke Co.	Elkhart, Ind.
Madison City Gas Light Co.	Madison, Wis.
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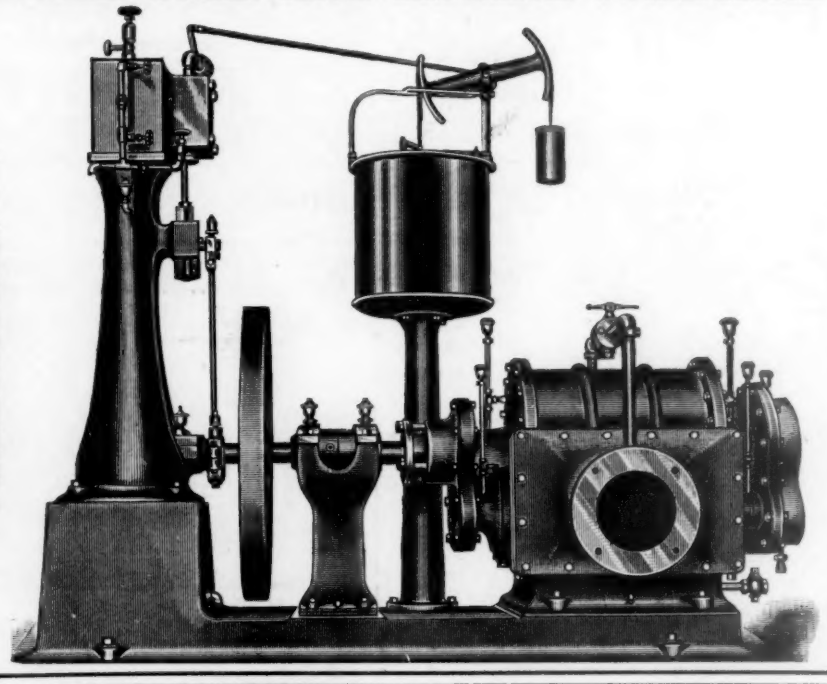

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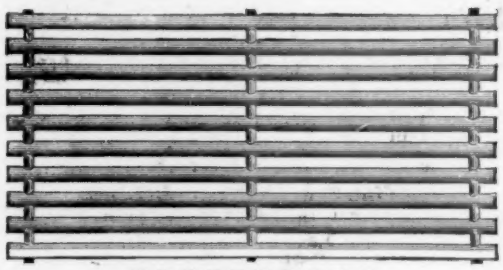

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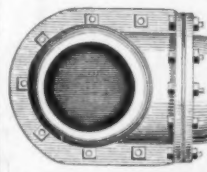

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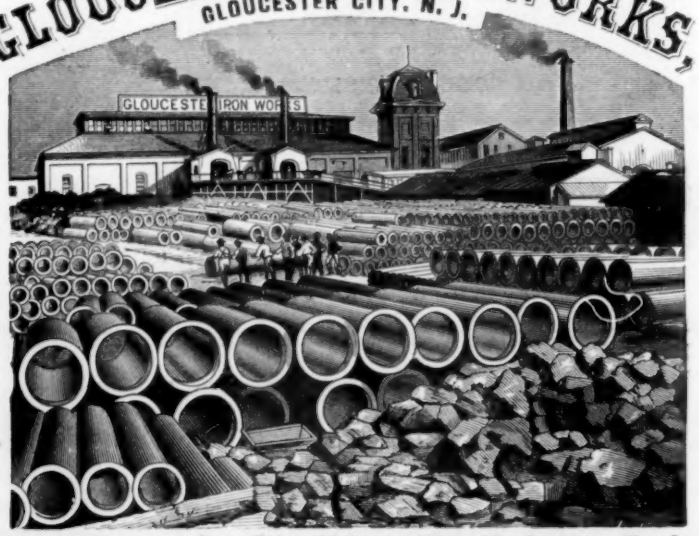

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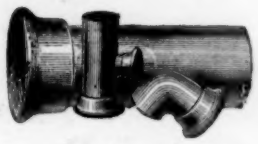

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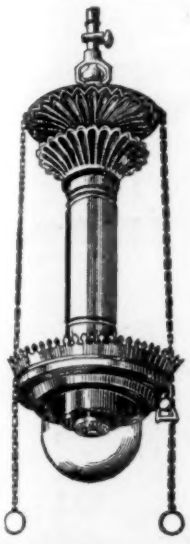

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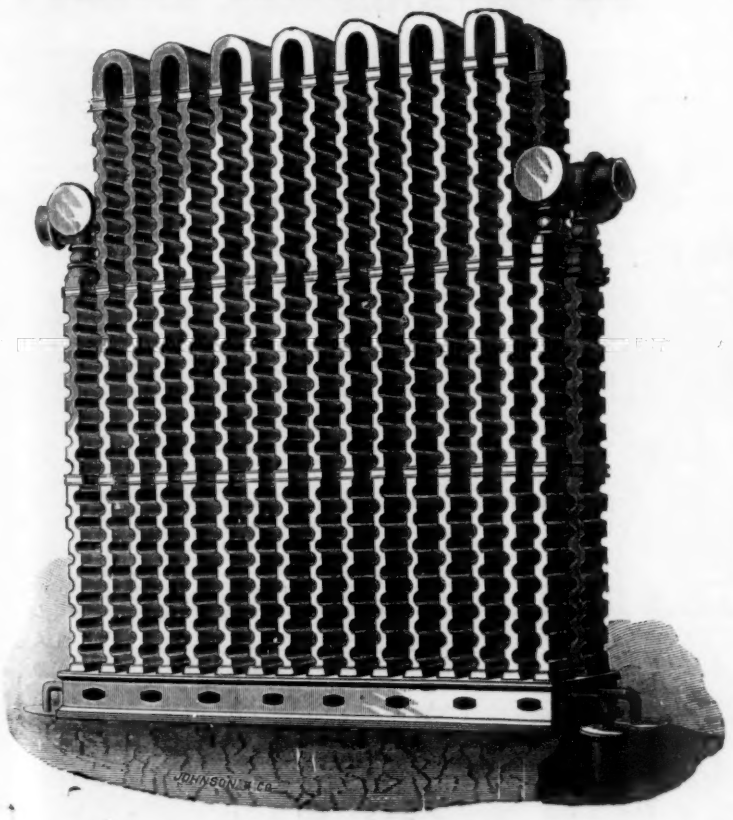

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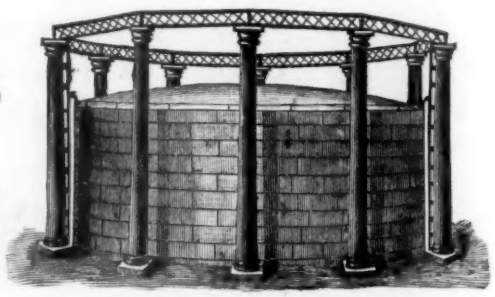

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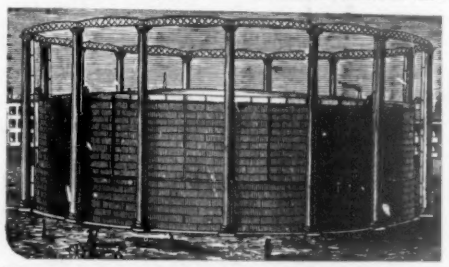

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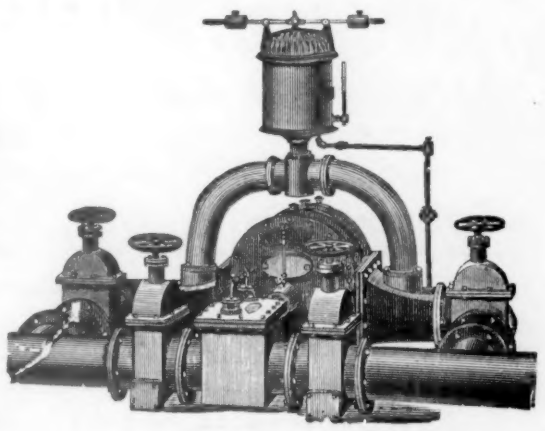

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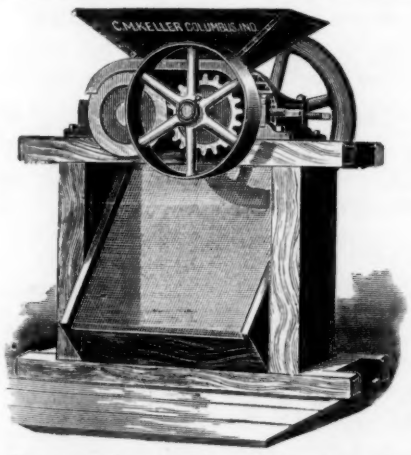

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SIZE.

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20 in. wide.	17½ in. wide.	18 in. wide.	21 in. wide.	
	12 in. deep.	13 in. deep.		

This Stove has four burners on top, and double oven burner.

Consumption of gas with all burners in use, 42 feet per hour, at 1 inch pressure.

The top is made in sections, so that a greater variety of cooking utensils may be used. By lifting out the covers and crosspieces and putting in a suitable forked ring, which is sent with each stove, a wash boiler or other large utensil may be set over two burners. Our **No. 87 GRIDDLE** also fits in the same position. The roasting oven is provided with a cast-iron door.

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SIZE.

Stove.	Oven.	Roaster.	Top.	Length over Extension Shelves,
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17 in. wide.	14½ in. wide.	15 in. wide.	16 in. wide.	
	12 in. deep.	13 in. deep.		

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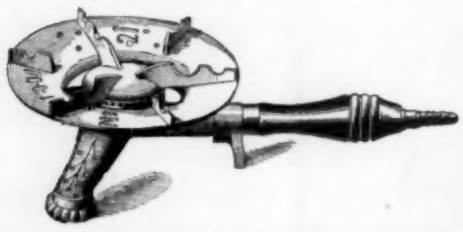

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[OFFICIAL NOTICE.]

Ohio Gas Light Association.

OFFICE OF SECRETARY,
COLUMBUS, O., February 21, 1889.

To Members of the Ohio Gas Light Association:—As heretofore announced the Fifth Annual Meeting of this Association will be held at Mansfield, Ohio, March 20 and 21, 1889; the first day's session to begin at 9:30 A.M. standard time.

The following papers are promised for the meeting:

1. "The Methods of Taxation of the Different Gas Companies, and a Comparison of the Same," by H. Wilkiemeyer, Portsmouth, Ohio.
2. "Fuel Gas and Incandescent Gas Lighting," by Edward Lindsley, Cleveland, Ohio.
3. "Gas Monopoly," by W. W. Cantine, Alliance, Ohio.
4. "A Holder-Tank Problem," by Geo. H. Tayler, Warren, Ohio.
5. "Oil as a Fuel under Boilers," by J W. Gwynn, Bucyrus, Ohio.
6. "Carbureted Water Gas and its Advantages over Coal Gas," by Chas. R. Faben, Jr., Toledo, Ohio.
7. "The Lowest Price at which Gas can be Profitably Sold in Small Towns," by H. L. Hurlburt, Oberlin, Ohio.
8. "Fuel Gas: Results of Experience in its Manufacture, Distribution and Use," by Chas. H. Evans, Jackson, Mich.
9. "The Welsbach Burner as a Commercial Article," by Geo. W. Graeff, Jr., Philadelphia, Pa.
10. "Advantages of a Combined Coal and Water Gas Plant," by Geo. Light, Dayton, Ohio.
11. "Results of the Adoption of Electric Lighting by a Gas Company," by L. A. Strong, Mansfield, Ohio.
12. "Is the Supply of Natural Gas in the Ohio Valley Failing?" by Eugene Printz," Zanesville, Ohio.

In connection with the meeting there will be an exhibit of gas stoves, engines, burners, electric motors and any and all kinds of apparatus and appliances of interest to gas men and the lighting fraternity. A large room close to the place of meeting has been secured for this purpose, aud the interims of the various sessions can be pleasantly and profitably spent in examining this display, which promises to be much more complete and interesting than the one shown at our last annual meeting.

In addition to this exhibit other objects of interest to members and visitors will be found in Mansfield's Electric Street Railway, the Gas Company's electric light works, and their new water gas plant.

The St. James Hotel will be the headquarters of our Association, where very reasonable terms have been secured for members and visitors in attendance at the meeting. The sessions will be held in a suitable hall in the block adjoining the St. James.

All members are again urged to attend this meeting prepared to participate in the discussion of papers read.

Persons eligible to membership, who are not already members, are cordially invited to be present and join our Association. Visitors from other States and Associations will be welcome.

Very respectfully, IRVIN BUTTERWORTH, Secy.

[OFFICIAL NOTICE.]

Second Annual Meeting of the Southwestern Gas Association.

FORT WORTH, TEXAS, Feb. 11, 1889.

The Second Annual Meeting of the South Western Gas Association will be held at Austin, Texas, Tuesday, March 19, 1889. It is earnestly requested that every member of the Association will make arrangements to be there. Matters of importance will come up for consideration, and a full attendance is desired.

There will be several interesting papers presented, and a good time generally is expected.

Austin is a city of especial interest to the fraternity, and in fact to everyone, being the central ray of that effulgent orb known as the Lone Star, Texas.

To those engaged in the gas business in Louisiana, Arkansas, Kansas, Colorado, New Mexico and Texas a cordial invitation is extended to join us and lend their aid and influence in the common cause—mutual improvement. This is not a Texas institution, but is designed to bring the